

Pueblo Ridge Restoration Project

Wildlife, Botany, and Fisheries Report

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for:

Camino Real Ranger District
Carson National Forest

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Introduction

The Pueblo Ridge Restoration Project encompasses approximately 10,000 acres and is located within on the Camino Real Ranger District an area with insect and disease threats that impact forest health and increase the risk of wildland fire. There is a need to reduce the stocking levels to improve forest health, improve structural and species heterogeneity, as well as reduce the surface and ladder fuels to improve fire resiliency.

The Carson National Forest and communities in Taos Canyon are concerned about wildfire risk to private residents and infrastructure adjacent to National Forest System Lands, especially in light of the wildfires that have affected southwestern communities in recent years. I am especially concerned with the area east of the Town of Taos in the Wildland Urban Interface (WUI) along the heavily trafficked Highway 64 corridor in Taos Canyon. Existing and potential hazardous fuels accumulations near and adjacent to residences in Taos Canyon and the Taos Pueblo create safety concerns for fire fighters, residents, and visitors, and the potential degradation of resource values.

The project is being designed to better protect personal and public property and resources, create a landscape (i.e., ecological conditions) that will improve the resilience of vegetation in response to wildland fire, and encourage the return of low and moderate-intensity fire as a natural process in the ecosystem. This project is considered a priority project for the Camino Real Ranger District and the Carson National Forest.

Project Area and Location

The Pueblo Ridge project boundary is 10,000 acres in size. The project area is located within the section of the Pueblo Ridge Watershed on USFS lands and is approximately 15 miles south of Taos, New Mexico. This project is located in portions of Sections 13, 14, 15, 16, 23, 24, 25 Township 25 North, Range 13 East, Sections 7-11, 13-32 Township 25 North Range 14 East, and Sections 7, 18, 19, 19, and 30 Township 25 North Range 15 East , Taos County, New Mexico (Figure 1). Elevations within the project area range from 7,100 to 10,400 feet.

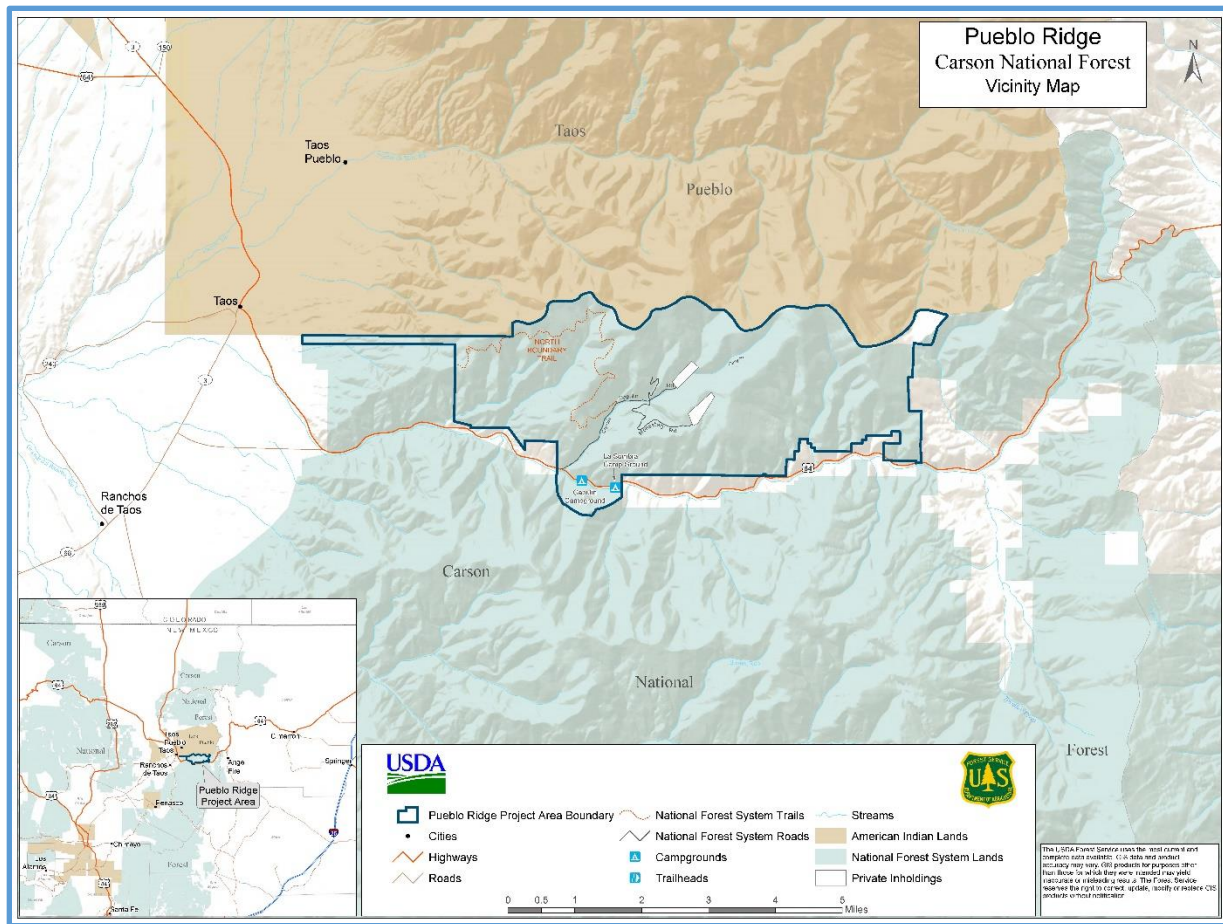


Figure 1. Pueblo Ridge Restoration Project Area.

Relevant Laws, Regulations, and Policy

The Forest Service is legally required to comply with a number of federal laws and their implementing regulations and policy. This section provides information regarding the laws, regulations, and policy that pertain to wildlife, fish, and sensitive species management.

National Environmental Policy Act of 1969 (NEPA), as amended [42 U.S.C. 4321-4347]

This law establishes a framework for environmental review and consultation requirements for major federal actions. To the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analysis and related surveys and studies required by the Fish and Wildlife Coordination Act [16 U.S.C. 470].

The National Forest Management Act of 1976 (NFMA) [16 U.S.C. 1600] and the 2012 Planning Rule [36 CFR Sec 219.19]

The National Forest Management Act, as implemented through the 2012 Planning Rule, requires the Forests to develop a plan which "...provide for the diversity of plant and animal communities, within the Forest Service authority and consistent with the inherent capability of the plan area..." This includes developing plan components that provide the ecological conditions necessary to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and

maintain viable populations of each species of conservation concern within the plan area. The Carson National Forest is currently revising the Forest Plan as the previous plan was under the 1982 MFMA planning rule (26 CFR 219).

Endangered Species Act of 1973 (ESA), as amended [16 U.S.C. 1531 et seq]

The Endangered Species Act (PL 93-205) requires that National Forest land be managed for both conservation and recovery of threatened, endangered, and proposed species. Section 7(a) (2) of the ESA, as amended, requires the responsible federal agency to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service concerning threatened and endangered species under their jurisdictions. It is Forest Service policy to analyze impacts to federally listed species to ensure management activities are not likely to jeopardize the continued existence of these species or result in the destruction or adverse modification of designated critical habitat. The analysis of federally listed species is documented in the Biological Assessment (BA) section of this report. Under the ESA, future state or private activities not involving federal activities that are reasonably certain to occur within the action area are subject for consideration for cumulative effects.

The Migratory Bird Treaty Act of 1918 (MBTA) [16 U.S.C. 703-712]

The MBTA implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. Under the act, it is unlawful to pursue, hunt, take, capture (or kill) a migratory bird except as permitted by regulation. The regulations at 50 CFR 21.11 prohibit the take, possession, import, export, transport, sale, purchase, barter, or offering of these activities, or possessing migratory birds, including nests and eggs, except under a valid permit or as permitted in the implementing regulations. The potential effects of the proposed action and alternatives on selected migratory birds are disclosed within the Migratory Birds section of this report.

Bald and Golden Eagle Protection Act of 1940 (BGEPA), as amended [16 U.S.C. 668-668c]

The BGEPA prohibits the “take” of bald and golden eagles, including their parts, nests, or eggs, unless the person is in possession of a permit issued by the Secretary of the Interior. “Take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.” Disturb” is defined as agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds (2001)

This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds and to actively protect birds and their habitat. This Order requires federal agencies to develop Memorandum of Understandings (MOU) with the USFWS to conserve birds and restore and enhance habitat, prevent or abate pollution affecting birds, and incorporate migratory bird conservation into agency planning processes whenever possible.

Executive Order 13443: Facilitation of Hunting Heritage and Wildlife Conservation (2007)

The purpose of this Order is to direct federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

Carson National Forest Land Management Plan, as amended (1996)

The Carson National Forest Land Management Plan, hereafter referred to as the “Forest Plan,” provides specific goals, objectives, standards, and guidelines for management activities on the Carson National Forest. The Forest Plan contains forest-wide and Management Area standards and guidelines. The Forest Plan also includes management direction for riparian and timber related activities, including integrating considerations for economics, water quality, soils, wildlife habitat, recreation opportunities, visual, and other values in project design.

The Forest Plan provides the following highlights regarding the desired conditions for wildlife and fisheries habitat management:

Maintain habitat for viable populations of all wildlife and fish species found on the Forest and improve habitat for selected species. This will be accomplished indirectly through intensive coordination of habitat manipulation with other resource activities and directly through intensive habitat management

Support New Mexico Game and Fish Department (NMGFD) in meeting its objectives of the New Mexico Comprehensive Wildlife Plan and in the reintroduction of native wildlife and fish species. Favor native species over new exotic species in stocking and introductions wherever possible.

Maintain and/or improve habitat for presently listed or endangered species of animals and other species as they are classified as threatened or endangered. Work towards the eventual recovery and delisting of species.

In addition, the Forest Plan also outlines species that were selected for management indicator species (MIS) as part of the 1982 NFMA (26 CFR 219). Management indicator species are a subset of all animal and plant species in a planning area selected for planning and management purposes (USFS 2011). The Forest Plan designates specific MIS with habitats that could best be used to analyze the effects of site-specific proposals on the Forest. The potential effects to the habitat occupied by MIS species is disclosed in the Management Indicator Species section of this report.

The Forest Plan outlines goals and objectives that would be met by this proposed project. These include:

Fire: “Activity created fuels and natural fuels will be treated to a level that the maximum tolerable loss objective can be met” (Fire – 2).

Timber: “Timber harvesting provides an opportunity to maintain or enhance the vegetation diversity and forest health” (Timber – 1).

Timber: “Provide green and dead firewood and other forest products on a sustained yield basis” (Timber – 1).

Timber: “Design timber resource activities with emphasis on benefits to wildlife, watershed, and recreation while maintaining productive timber stands and providing wood products” (Timber – 1).

Appendix C - Mexican Spotted Owl Habitats

The 1996 Amendment to the Carson Forest Plan provides guidance for the management of Mexican Spotted Owl (MSO) habitat and is consistent with the 1995 Mexican Spotted Owl Recovery Plan.

Standards from the 1996 Amendment specify three levels of habitat management for MSO; protected habitat, restricted habitat and other forest and woodland types. Protected areas include protected activity centers (PAC's), mixed-conifer stands with slope greater than 40 percent where timber harvest has not occurred in the past 20 years and all legally and administratively reserved lands. Restricted areas consist of unoccupied MSO habitat that is managed for nesting and roosting conditions. A minimum of 25 percent of MSO restricted habitat is to be managed to provide nest/roost characteristics of 150-170 ft²/acre basal area (BA) and at least 20 trees per acre that are 18 inches diameter at breast height (DBH) or larger.

Protected Areas and Protected Activity Centers (PACs)

Allow no timber harvest except for fuelwood and fire risk abatement in established PACS.

Allow no timber harvest except for fire risk abatement in mixed-conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years.

Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed fire to abate fire risk in the remainder of the PAC outside the 100 acre "no treatment" area.

Large woody debris, snags, clumps of broadleaf wood vegetation should be retained and hardwood trees larger than 10 inches at the root collar.

Limit human activity in PACS during the breeding season (March 1 through August 31).

Restricted Areas - Mixed-conifer and Pine-oak Forests

Manage to ensure a sustained level of owl nest/roost habitat well distributed across the landscape. Create replacement owl/roost habitat where appropriate while providing a diversity of stand conditions across the landscape to ensure habitat for a diversity of prey species.

Emphasize uneven-aged management systems. However, both even-aged and uneven-aged systems may be used where appropriate to provide variation in existing stand structure and species diversity.

Save all trees greater than 24 inches diameter at breast height (dbh).

In pine-oak forests, retain existing large oaks and promote growth of additional oaks.

Encourage prescribed fire and fire for resource benefits to reduce hazardous fuel accumulation. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire.

Retain substantive amounts of key habitat components: snags 18 inches in diameter and larger, down logs over 12 inches midpoint diameter, hardwoods for retention, recruitment, and replacement of large hardwoods.

Twenty-five percent of the restricted mixed-conifer habitat area provides MSO nest/roost characteristics: 10 percent basal area 170 ft², 15 percent basal area >150 ft², twenty trees per acre 18 inches and greater, and 10 percent of total stand density in trees 12-18 inches, 18-24 inches and 24 inches and greater size classes, respectively.

Ten percent of the restricted pine-oak habitat area provides MSO nest/roost characteristics: basal area >150 ft², twenty trees per acre 18 inches and greater, and 15 percent of total stand density in trees 12-18 inches, 18-24 inches and 24 inches and greater size classes respectively. Oak >20 ft² of basal area. All trees >24" diameter, substantive amounts of snags >18" diameter, down logs >12" midpoint diameter, and hardwoods are retained following management treatments. Uneven-aged stands are present.

Restricted Areas – Riparian Forests

Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.

Appendix C – Northern Goshawk

Elements that relate to northern goshawk forest habitat apply to the forest and woodland communities described below that are outside of Mexican spotted owl protected and restricted areas:

Manage for uneven-age forest stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels throughout woodland, ponderosa pine, mixed-conifer, and spruce-fir forest cover types. Manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Sustain a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape.

Limit human activity in or near nest sites and Post-Fledgling Family Areas (PFAs) during the breeding season (Mar. 1 through Sept. 30).

Where VSS 6 is deficit within the ecosystem management area, all VSS 6 would be maintained regardless of location.

The distribution of vegetation structural stages for ponderosa pine and mixed-conifer is 10 percent grass/forb/shrub (VSS 1), 10 percent seedling-sapling (VSS 2), 20 percent young forest (VSS 3), 20 percent mid-aged forest (VSS 4), 20 percent mature forest (VSS 5), 20 percent old forest (VSS 6). Distribution of habitat structures should be evaluated at the ecosystem management area level, at the mid-scale such as drainage, and at the small scale of site (appendix A).

Landscapes outside of Goshawk Post Family Fledging Areas (PFAs; hereafter referred to as Foraging Areas)

Ponderosa pine: canopy cover for mid-aged forest (VSS 4) should average 40+ percent, mature forest (VSS 5) should average 50+ percent, and old forest (VSS 6) should average 60+ percent. Maximum opening size is up to 4 acres with a maximum width of up to 200 feet. Retain 1 group of reserve trees per acre of 3-5 trees per group for openings greater than 1 acre in size.

Snags are 18 inches or larger dbh and 30 feet or larger in height, downed logs are 12 inches in diameter and at least 8 feet long, woody debris is 3 inches or larger on the forest floor. In the ponderosa pine forest leave at least 2 snags per acre, 3 large downed logs per acre, and 5-7 tons of woody debris per acre. In the mixed-conifer forest type leave 3 snags per acre, 5 downed logs per acre, and 10-15 tons of woody debris per acre.

Within Post Family Fledging Areas (PFAs)

Ponderosa pine: canopy cover for mid-aged forest (VSS 4) should average 1/3 60+ percent and 2/3 50+ percent. Mature (VSS 5) and old forest (VSS 6) should average 50+ percent. Mixed-conifer: canopy cover for mid-aged (VSS 4) to old forest (VSS 6) should average 60.

Within Nesting Areas

Thin from below with non-uniform spacing and use hand tools and fire to reduce fuel loads. Lopping and scattering of thinning debris is preferred if prescribed fire cannot be used. Piling of debris should be limited.

Appendix C – Old Growth

Elements that relate to forest vegetation operations for old growth allocation include the following:

Seek to develop or retain old growth function on at least 20 percent of the naturally forested area by forest type in any landscape.

All analyses should be at multiple scales-one scale above and one scale below the ecosystem management areas (appendix A).

Forest Service Manual and Handbooks (FSM/H 2670)

Under FSM 2670.2, National Forest System habitats and activities for threatened and endangered species are to be managed in order to achieve protection and recovery objectives so that special measures provided under the ESA are no longer necessary. The Forest Service is to avoid all adverse impacts on threatened and endangered species and their habitats except when it is possible to compensate adverse effects totally through alternatives identified in a Biological Opinion (BO) rendered by the US Fish and Wildlife Service, when an exception has been granted under the Act, or when the USFWS BO recognizes and incidental taking. Potential effects of proposed activities on federally listed threatened, endangered, and proposed species and their designated critical habitats are disclosed in the Biological Assessment (BA) section of this report.

FSM 2670.4 also provides guidance Forest Service sensitive species are animal and plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on national forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a trend toward federal listing or a loss of viability. This analysis is documented in the Biological Evaluation (BE) section of this report.

Resource Indicators and Measures

Resource indicators and the associated measures are utilized to analyze and disclose potential project effects on wildlife and habitat. More specifically, these measures are quantifiable and sensitive to change. *Not all resource indicators are applicable to all species or habitat types and not all potential effects are described as resource indicators.* It is assumed project activities will affect the measures by changing the existing conditions. The resource indicators selected for this project are listed in **Table 1** and are further explained in the *Existing Conditions* section.

Table 1. Resource indicators and measures for assessing project effects to wildlife and habitat.

Resource Element	Resource Indicator	Measure	Source (laws, regulation, or policy)
Wildlife habitat	Cover/habitat type or keystone habitat feature (also referred to as "suitable habitat") <i>Specific language for Mexican spotted owl applies.</i>	Acres , stream miles, or habitat feature (e.g. number of springs or snags) affected	ESA, Forest Plan, FSM/H
Wildlife habitat	Forest structure - Diameter distribution <i>Specific requirements for Northern goshawk applies.</i>	Vegetation structural stage classes (VSS)	Forest Plan, FSM/H

Resource Element	Resource Indicator	Measure	Source (laws, regulation, or policy)
Old Growth	Old growth allocation	Acres of old growth forest present after allocation	Forest Plan

Existing Conditions

Vegetation

Current forest vegetation conditions are the result of various human activities that have changed the historical condition of the forests and shaped the existing forest structure and composition. As a consequence of this changed condition from the historical, forests have experience lowered resistance and resilience with respect to disturbance agents.

Existing stand densities are considerably higher when measured by basal area (BA) and trees per acre (TPA). These elevated stand densities, when combined with drought, can make the existing stands very susceptible to disturbance agents including; bark beetles, spruce budworm, as well as root diseases.

There has also been considerable deviation from the historic stand structure. Stand structure is increasingly homogenous, and openings once dominated by grasses and forbs have been encroached and overtopped with conifers. Stands that were more open and park like, dominated by large diameter trees, now interlocking crowns with small diameter, later seral species creating “fuel ladders” from the forest floor into the canopies of the dominant trees.

Many of the stands in the project area are undergoing species conversion from early seral species to later seral species. The early seral species trees tend to be the older and larger, dominant trees in most stands. These large trees are being “out-competed” younger later seral species trees and the early seral, larger trees are not able to reproduce. Stands of aspen and oak are being encroached upon, and overtopped by conifers and they are slowly being extirpated from the landscape. In many areas, riparian vegetation is also being encroached and overtopped by conifers. This section includes the existing conditions that could potentially affect wildlife species and their habitats. Specific metrics for each condition are described in the *Resource Indicators and Measures* section and are analyzed on a species-specific basis within this report.

Cover/Habitat Type or Keystone Habitat Feature

In general, suitable habitat for a species is considered any habitat where a species could potentially or does occur. More specifically, the specific species may breed, forage, or perform necessary behaviors to ensure natural history requirements are met within this habitat. Because this varies between species, the number of acres or stream miles of species-specific habitats or the presence or change in keystone features are analyzed within the appropriate species section of this document. A keystone habitat feature is defined as a habitat element that a species relies on to persist within the environment, such as snags or roosting trees.

Given the expansive nature of the project area, multiple vegetation types occur. In general, the highest elevations are generally dominated by mixed-conifer stands consisting of Douglas fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*), with small inclusions of Engelmann spruce (*Picea*

engelmannii). Aspen (*Populus tremuloides*) stands are scattered throughout drainages and at higher elevations and on many east-facing slopes. The lower, more xeric portions of the area (generally on south or west-facing slopes) are dominated by a ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelli*) association. Extensive stands of piñon pine (*Pinus edulis*) and various juniper species (*Juniperus scopulorum*, *J. monosperma*, and *J. osteosperma*) also occur within the lower-elevation areas. Affected acres by forest cover type are summarized in Table 2.

Current forest vegetation conditions are the result of various natural and human activities that have changed the historical condition of the forests and shaped the existing forest structure and composition. Timber harvest over the past century and a half has removed many of the larger shade-intolerant species. This selective timber harvest combined with the suppression of fire has increased the amount of shade tolerant species across the project area. As a consequence of this changed condition from the historical, forests are experiencing lowered resistance and resilience with respect to disturbance agents. Existing forest types in the project area and their percentage of the project area are displayed below.

There are 9 known springs within the project area. Due to the habitat variability, the number of acres of suitable habitat that a spring provides is not quantifiable but effects to species and habitat that may utilize these springs is disclosed.

Table 2. Forest Cover Types within the Pueblo Ridge Project Analysis Area

Forest Cover Type	Area (acres)	Existing Relative Density	Proportion of Analysis Area (%)
Mixed-Conifer	3,855	67.1%	40%
Ponderosa Pine	2,776	70.6%	28%
Piñon/Juniper	2,368	82.1%	24%
Aspen	476	65.1%	5%
Spruce/fir	51	71.5%	<1
Gambel Oak	183	45.1%	2%
TOTAL	9,709		100%

Forest Structure - Diameter Distribution

The Goshawk Scientific Committee developed the Vegetation Structural Stages (VSS) desired condition guidelines (Reynolds et al. 1992) which were later adopted as part of the Carson Forest Plan. This ecosystem management approach aims at defining structural stage guidelines and recommendations for goshawk habitat. The forest structure of wildlife habitat can determine whether some species will be present or absent. The stages range from 1-6. VSS 1 stands are the youngest (early seral stage) and primarily consist of grasses, forbs, shrubs, seedlings and saplings less than one-inch in diameter. VSS 6 stands are mature forests consisting largely of trees greater than 24 inches in diameter (late seral stage). Habitat containing a variety of VSS classes is preferred by many wildlife species.

Current conditions are dominated by even-aged/even-sized stand structures in ponderosa pine and mixed-conifer forests, and pinyon-juniper woodlands within the project area (Table 2). Most ponderosa pine and mixed-conifer stands in the project area fall within VSS 3, 4, and 5. Reynolds et al. (2013) define even-

aged forests as comprised of one or two distinct age classes and uneven-aged forests as comprised of three or more distinct age classes.

Table 3. Size class distribution within all stands, Pueblo Ridge project area (all lands).

FOREST COVER TYPE	VEGETATION STRUCTURAL STAGE (VSS)(AC/%)							% OF TOTAL ACRES
FOREST COVER TYPE	VSS 1 (0-0.9" DBH*)	VSS 2 (1-4.9" DBH)	VSS 3 (5-11.9" DBH)	VSS 4 (12-17.9" DBH)	VSS 5 (18-23.9" DBH)	VSS 6 (24"+)	TOTAL ACRES	% OF TOTAL ACRES
Aspen	0 (0%)	112 (24%)	141 (30%)	206 (43%)	17 (4%)	0 (0%)	476	4.9
Ponderosa Pine	0 (0%)	40 (1%)	684 (25%)	849 (30%)	649 (24%)	554 (20%)	2,776	28.5
Mixed Conifer	138 (4%)	0 (0%)	1,048 (27%)	1,938 (50%)	561 (15%)	170 (4%)	3,855	44.1
Spruce-fir	0 (0%)	0 (0%)	0 (0%)	26 (45%)	0 (0%)	25 (44%)	51	0.6
Oak Woodland	0 (0%)	41 (23%)	87 (48%)	0 (0%)	55 (30%)	0 (0%)	183	1.8
Pinyon-Juniper	0 (0%)	0 (0%)	0 (0%)	907 (38%)	1,441 (48%)	20 (1%)	2,368	24.3
TOTAL ACRES	138	194	1,959	3,923	2,726	769	9,709	100.0
% OF TOTAL ACRES	1.4	2.0	20.2	40.4	28.1	7.9	100.0	

*Diameter at Breast Height (DBH) is the measurement of the diameter of the stem of a tree measured approximately 4.5 feet above ground on the uphill side.

Forest Structure - Stand Density

Stand density can be indicative of forest health and tree vigor. This is important because stand density is the major factor that the forester can manipulate. Relative competition among trees can be measured through basal area (BA), i.e. the cross-sectional surface area of tree stems measured at breast height, or through the number of trees per acre. The number of trees per acre is dependent on the size classes present and existing stand density index (SDI), i.e. an index that expresses tree stocking or crowding relative to the relationship between the numbers of trees to the stand quadratic mean diameter.

There has also been considerable deviation from the historic stand structure. Stand structure is increasingly homogenous. Openings once dominated by grasses and forbs have been encroached and overtopped with conifers. Stands that were more open and park-like, dominated by large diameter trees, now have smaller diameter trees with interlocking crowns with small diameter, later seral species creating

“fuel ladders” from the forest floor into the canopies of the dominant trees. Many of the stands in the project area are undergoing species conversion from early seral species to later seral species. The early seral species trees tend to be the older and larger, dominant trees in most stands. These large trees are being out-competed by younger later seral species trees and the early seral, larger trees are not able to reproduce. Stands of aspen are being encroached and overtopped by conifers and they are slowly being removed from the landscape. In many areas, riparian vegetation is being encroached and overtopped by conifers.

In the forested portions of the project area, vegetation resource conditions have changed, primarily due to fire exclusion. Specifically, there are more trees (densification) and understory vegetation (shrubs, brush, and small diameter trees) than what historically occurred under a frequent, low-intensity fire regime

Old Growth Allocation

Old Growth was not identified as an issue during internal scoping of the project. Old growth is defined as containing a number and minimum size of both seral and climax dominant trees that are multi-aged, multi-layered canopies, minimum number and specific size of snags, and adequate number of downed logs and coarse woody debris (Helms, 1998). The 1996 Forest Plan Amendment provides guidelines relevant to old growth and these guidelines have been followed during the planning phase of this project. Characteristics of old growth specified by the 1996 Forest Plan Amendment include number, age, size and length of downed logs, and the number of tree canopies. Appendix A identifies minimum structural attributes that must be considered to determine old growth on the Carson National Forest. The 1996 Forest Plan Amendment states that no less than 20% of each forested ecosystem management area must be allocated to old growth.

Stand exam data collected across 98% of the project area was used to identify stands with old growth characteristics. Analysis of stand exam data suggests that approximately 23.3 percent of the project area (2,288 ac.) meets or exceeds minimum old growth thresholds. Figure 2 displays stands that have been identified as old growth within the project area. The Forest Plan as amended mandates that there should be 20 percent old growth in five forest types¹. As can be seen in Table 4, within the project area 48 percent of the Pinyon-Juniper stands, 31.7 percent of the ponderosa pine stands and 9.5 percent of the mixed conifer stands meet the requirement for old growth. None of either the aspen or Engelmann spruce-subalpine fir stands meet the requirements for old growth.

Table 4. Old Growth by Forest Cover Types within the Pueblo Ridge Project Analysis Area

Forest Cover Type	Acres of Old Growth	Percentage of their Forest Types
Mixed-Conifer	368	9.5%
Ponderosa Pine	880	31.7%
Piñon/Juniper	1,036	43.7%
Aspen	0	0.0%
Engelmann Spruce-Subalpine fir	0	0.0%
Old growth totals within Project Area	2,284	23.3%

¹ Pinyon-Juniper, Ponderosa Pine, Aspen, Mixed –Conifer and Engelmann Spruce - Subalpine Fir.

Desired Conditions

Desired conditions have been determined by comparing existing conditions against historical ranges for forest conditions such as stand density, forest structure, forest health, and species composition in riparian areas. National Forest lands within the project area have departed from the densities, structures, composition, and processes that have historically promoted conditions that are resilient to uncharacteristic disturbances from wildfire, insects, disease, and changing climate. Desired environmental conditions for the project area would be more similar to those found historically, with lower tree densities, lower fuel loading, and a diverse mix of tree sizes and age classes intermixed with openings for new tree growth and native grass, forb, and shrub growth as well as less severe fire across the project area. Desired environmental conditions would also include sustained meadows, forage and small openings for wildlife and livestock, reduced erosion particularly in riparian areas, and retention of natural riparian species. Overall, the goal of the Pueblo Ridge project would not be to mimic one condition in time, but to reference conditions that are more resilient to disturbance and relatively rapid changes in climate. There is a need to move vegetation within the project area toward desired conditions in order to increase tree vigor and forest health, reducing the susceptibility to severity of uncharacteristic disturbances from wildfire, insects, disease, and changing climate.

The need for the proposed action has been determined by comparing the existing conditions to the desired conditions, which are based on the most recent, best available science, and are largely derived from historic conditions and from the Carson National Forest Plan, as amended to include standards and guidelines for Mexican spotted owl habitat, northern goshawk habitat, and old growth allocation. Some of these specific conditions are outlined in Table 4. Desired conditions for forest vegetation are described in terms of composition (species mix), structure (size, density, and vertical or horizontal arrangement), and function (interaction with other physical, chemical, and biological elements of the forest environment). Composition, structure, and function relate directly to forest values, including forest health, wildlife habitat, aesthetics, sustainable forest products, livestock grazing, soil and watershed condition, and fire regime. The desired forest composition and structure affect the desired function of frequent-fire forests.

The general desired condition for frequent-fire forests, such as ponderosa pine and dry mixed-conifer cover types, includes a diversity of stand densities and variety in terms of forest structure and age. There should be diversity in how trees are spaced across the landscape, with areas of canopy gaps and interspaces. Lower density and higher abundance of canopy gaps would enable resistance to crown fire propagation and spread. An uneven-aged forest should favor shade-intolerant tree species, which are typically most resistant to fire effects, including ponderosa pine and Douglas-fir. Shade tolerant conifer species such as white fir would occur, but they would not be the dominant species. Other species such as quaking aspen, Gambel oak (shrub form), and other hardwood species should be well represented and regenerate successfully across the landscape. Shrubs may persist in the understory and in openings, but their stature and continuity would be checked by frequent low intensity fire. Diversity in structure and age would provide variety in wildlife habitats and slow the spread of disturbance agents, such as insects or disease, given the variability of conditions, although normal levels of native insects and disease should continue to be present. The priority in these cover types is to manage for Mexican spotted owl (MSO) habitat. Stands not considered MSO habitat would be managed for Northern goshawk habitat, as well as quality habitat for the hairy woodpecker, turkey, elk, red squirrel (for mixed-conifer), and Abert's squirrel (for ponderosa pine), among others.

The general desired condition for the piñon/juniper cover type includes reduced stand densities, reduced surface fuels, and balanced age classes with openings and variable spacing. Openings would be full of grass, forbs, and/or seedlings and saplings. A variety of shrubs may persist in the understory and in

openings. Juniper species would be present in the canopy, and there would be good habitat for the plain titmouse and elk.

The general desired condition for riparian areas would include reduced erosion and retention of natural riparian species.

Table 5. Specific desired conditions compared to current conditions for resource indicators as analyzed within this document.

Resource Indicator	Existing Condition	Desired Condition
Forest Structure - Diameter Distribution (VSS) in ponderosa pine within treatment areas	VSS 1: 0%; 0 acres VSS 2: 1%; 40 acres VSS 3: 25%; 686 acres VSS 4: 30%; 845 acres VSS 5: 24%; 656 acres VSS 6: 20%; 442 acres	VSS 1: 10%; 280 acres VSS 2: 10%; 280 acres VSS 3: 20%; 557 acres VSS 4: 20%; 557 acres VSS 5: 20%; 557 acres VSS 6: 20%; 557 acres
Old growth allocation within the project boundary	Piñon/juniper: 44%; 1,038 acres Ponderosa pine: 32%; 881 acres Mixed-conifer: 10%; 379 acres Spruce and spruce/fir: 0%; 0 acres	Piñon/juniper: 20%; 475 acres Ponderosa pine: 20%; 557 acres Mixed-conifer: 20%; 783 acres Spruce and spruce/fir: 20%; 12 acres

Alternatives

Two alternatives are proposed for this project: Alternative 1 – Proposed Action, Forest Plan Amendments and Alternative 2 – No Forest Plan Amendments. A brief summary of the activities included in the alternatives follows. The alternatives are described below, separated by activity.

Forest Plan Amendments

Alternative 1

The Carson forest plan, currently under revision, was written in 1986 and no longer incorporates best available scientific information. Anticipating the potential for this, both the National Forest Management Act and the 2012 National Forest System Land Management Planning Rule (2012 Planning Rule) have allowed the use of project-specific forest plan amendments in order for management activities to adapt to changing conditions and be improved based on new information. Alternative 1 includes two project-specific forest plan amendments. One would incorporate the best available science for restoration in frequent-fire forests (Reynolds et al. 2013), as well as management direction in the revised Mexican spotted owl recovery plan and clarifying language for northern goshawk management. The other amendment would allow ground-based mechanical harvesting with specialized equipment designed for operating on steep slopes. The two proposed amendment are discussed below.

- 1) Incorporate best available science for restoration in frequent-fire forests (Reynolds et al. 2013), including management direction in U.S. Fish and Wildlife Service's revised Mexican spotted owl recovery plan and clarifying language for northern goshawk management.

The Carson forest plan provides guidelines to manage for uneven-aged stand conditions but does not provide guidelines for managing interspaces at the fine scale. Recent science (Reynolds et al. 2013) has shown more interspaces were present on the landscape historically, and it is part of the natural fire regime for these interspaces to remain essentially treeless as a result of frequent fires. To meet restoration objectives, there is a need for a project-specific forest plan amendment to

include the definition of interspaces, how interspaces and openings relate to vegetation structural stage, and how canopy cover would be measured across the landscape.

There are substantial differences between the 2012 Mexican spotted owl recovery plan and the current forest plan, as well as recent scientific recommendations regarding northern goshawk management, that impede the ability of Carson National Forest personnel to adequately create and maintain sufficient habitat for these two species under the 1986 forest plan. Therefore, a project-specific forest plan amendment would need to address the direction provided in more recent documents. Specifically, this forest plan amendment would:

- update definitions and direction for Mexican spotted owl protected habitat (protected activity centers), recovery habitat, and other forest and woodland types to align with the current recovery plan;
 - update language and direction related to prescribed cutting and fire treatments in protected activity centers to be consistent with the current recovery plan;
 - add forest structure guidelines for Mexican spotted owl recovery habitat;
 - add direction for riparian forest habitats;
 - update Mexican spotted owl survey information;
 - remove the direction for treating Mexican spotted owl habitat in incremental percentages;
 - replace forest plan standards and guidelines for ponderosa pine and dry mixed conifer (including northern goshawk direction) with desired conditions and guidelines;
 - convert habitat structure analysis for old growth and vegetation structural stage from three scales of analysis (fine-scale, mid-scale, and large-scale)² to one scale of analysis (project-level) to better inform project planning and design;
 - add a desired condition for the percentage of interspaces within uneven-aged stands to facilitate restoration; and
 - add the desired interspace distance between tree groups.
- 2) Allow ground-based mechanical harvesting with specialized equipment designed for operating on steep slopes to incorporate the most recent advances in harvest technologies into project implementation.

Without this project-specific forest plan amendment, the likelihood of meeting the project's purpose and need would be diminished. Within the Pueblo Ridge Restoration project area, there are 2,921 acres of National Forest System lands with slopes of 40 percent gradient or more. These areas exhibit conditions indicating they are prone to active crown fire. Stand improvement thinning in these areas would be necessary before prescribed burns could be safely and responsibly applied, and conducting stand improvement thinning using nonmechanical methods, such as hand treatment, would be labor intensive, impractical, or both. This would result in diminished treatment or no treatment in these areas.

² Fine scale is equivalent to an area within a portion of an ecosystem management area. Mid-scale is identified as an ecosystem management area, typically 10,000 to 100,000 acres and delineated based on human values, use patterns, and physical and biological factors such as watershed boundaries. Large scale would consist of an area across adjacent ecosystem management areas.

Mechanized equipment technology has improved since the 1986 forest plan was approved. At the time the forest plan was approved, the use of ground-based mechanized equipment resulted in impacts to slopes greater than 40 percent; for example, damage to stabilizing vegetation and increased erosion. Current technology includes ground-based mechanized equipment, such as harvesters and forwarders, capable of tethering to trees with a winch. The use of this kind of equipment results in fewer impacts than previous equipment types. While use of this equipment is generally more costly than standard equipment, these costs are reasonable and less prohibitive than hand-thinning treatments.

The proposed project includes nine management areas. Relevant standards and guidelines from the 1986 forest plan will be applied for each management area, unless amended by project-specific forest plan amendments as described above.

Alternative 2

There are no forest plan amendments proposed for alternative 2.

Appendix A contains a table comparing management direction under alternatives 1 and 2 for Mexican spotted owl and northern goshawk.

Vegetation and Fuels Treatments

Alternative 1

Forest thinning treatments on 9,709 acres would utilize conventional non-ground-based equipment (e.g. skyline yarders), harvesters, and forwarders, including those capable of operating on slopes of up to 75 percent with the assistance of winches. Masticators and equipment such as excavators capable of piling fuel on steep slopes would also be utilized where appropriate.

Alternative 2

Hand-thinning treatments and cutting of understory ladder fuels (for example, shrubs, conifer regeneration) would occur as needed throughout the project area, along with lop-and-scatter techniques to reduce ladder fuels. Commercial and personal-use Christmas tree sales would also occur in areas that meet guidelines for Christmas tree harvesting.

Hand and machine piling and burning would occur throughout the project area where not restricted by slope as an option to reduce natural and activity-created fuels. Remaining trees in treatment units would be pruned 8 to 10 feet high, where necessary, to raise tree canopy base heights. Small trees would be cut as needed to create a burnable fuel bed prior to prescribed fire.

Availability of fuelwood on up to 9,709 acres would include dead and down fuelwood harvesting, where appropriate, and cutting and decking, where appropriate. This would be conducted off designated temporary roads and would include off-road travel to specific fuelwood-cutting areas. Fuelwood would be cut, removed, and decked away from riparian areas and slopes with a gradient greater than 40 percent. Fuelwood harvesting activities would cease once temporary roads are closed following thinning activities. Public firewood collection would be offered as part of the fuelwood proposal.

Throughout the project area, prescribed burning (including broadcast, jackpot, under-burning, pile burning, and other common acceptable methods) is proposed to reduce surface, ladder, and canopy fuels and break up contiguous vegetation. Prescribed fire and other fuels reduction treatments, such as

mastication and chipping, would be applied throughout the project area to reduce and maintain appropriate levels of surface, ladder, and crown fuels. This would be conducted using a variety of ignition methods on a schedule that would mimic natural fire return intervals. Units would be burned with varying fire intensities resulting in mixed-severity fire effects and creating a mosaic of burned and unburned patches. Prescribed fire could occur before or after initial thinning treatments are completed to afford fire managers flexibility with implementation. Multiple entries of prescribed fire would be needed to maintain post-treatment conditions and to mimic historical fire return intervals to restore fire to fire-adapted ecosystems.

Mastication treatments, including the use of boom-mounted masticators, would occur, where appropriate, across the project area to reduce fuels. Chipping residual fuels and biomass in conifer stands would be included as an option to reduce fuels prior to prescribed fire.

Restoration Treatments

Both Alternatives

Up to 10.5 miles (approximately 32 acres) of riparian restoration treatments along streams within the project area and adjacent to the Rio Fernando in the La Sombra and Capulin Campgrounds would improve riparian habitat (see figure 2). Treatments could include conifer removal, ladder fuel reduction, and interconnected canopy reduction. Aspen restoration treatments would occur on 481 acres throughout the project area including in the fuelbreaks. These treatments would selectively remove conifers within aspen stands and within 150 feet of aspen stands to increase aspen regeneration. Fuels remaining on site would be treated through prescribed fire or mechanical means to further promote aspen regeneration.

Road Management

Alternative 1

No new permanent roads would be constructed under this alternative. With the proposed forest plan amendment, steep-slope mechanized equipment would be used to access treatment areas; for example, steep-slope cut-to-length harvesters and forwarders with the capability of tethering to trees with a winch.

Alternative 2

Up to 5 miles of new permanent road would be constructed to access units in the southeastern portion of the project area. The new road would be used for project activities but would be closed to the public without written authorization or permit. The road would be closed after project implementation (see figure 6).

Both Alternatives

Proposed road management includes rerouting some existing roads, decommissioning and closing 13 or more miles of existing roads after project implementation, constructing approximately 5 miles of temporary road, and maintaining current National Forest System roads for project activities. Temporary roads are roads necessary for emergency operations or authorized by contract, permit, lease, or other written authorization; they are not forest roads and are not included in a forest transportation atlas (36 CFR 212.1). Rerouting existing system roads and up to 5 miles of temporary road construction would occur during implementation to allow access to thinning units (see figure 5 and figure 6). The temporary roads would be decommissioned once the project is completed.

Road maintenance would occur on approximately 5 miles of roads currently open to the public and on 39 miles of administratively managed roads currently closed to the public. Part of the North Boundary Trail is proposed for a haul route. Decommissioning of 13 or more miles of closed roads would be included to reduce erosion from current road conditions. Decommissioning may be accomplished through a variety of methods, including but not limited to, abandonment, scarifying, revegetation of roadbeds, recontouring of roadbeds, installation of dirt or stone barriers, scattering of activity-generated large woody debris on roadbeds, or a combination of these things. Decommissioned roads would be removed from the national forest road system. They would continue to be tracked in the transportation atlas for future reference. The roads proposed for decommissioning do not include roads needed for grazing or other permittee access, fire suppression, or administrative access for forest management.

Range Improvements

Alternative 1

Range improvement activities include up to nine spring developments, two guzzlers, and one corral. Likely spring development locations are shown in figure 5 but may occur anywhere in the Capulin allotment. The springs would be fenced with wildlife-friendly fencing, and water would be piped to drinkers outside fenced areas. The corral would be built to improve livestock distribution on the Capulin allotment.

Alternative 2

Range improvement activities include up to four spring developments, two guzzlers, and one corral. Likely spring development locations are shown in figure 6 but may occur anywhere in the Capulin allotment. The springs would be fenced with wildlife-friendly fencing, and water would be piped to drinkers outside of fenced areas. The corral would be built to improve livestock distribution on the Capulin allotment.

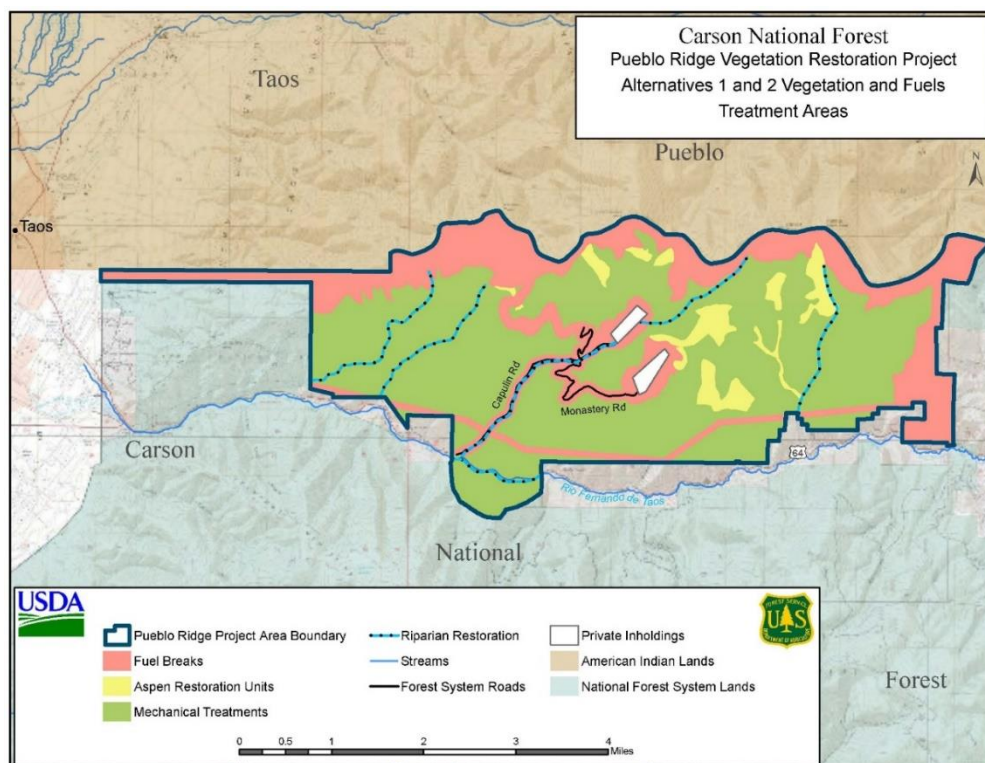


Figure 2. Alternatives 1 and 2 Vegetation and Fuels Treatment Areas

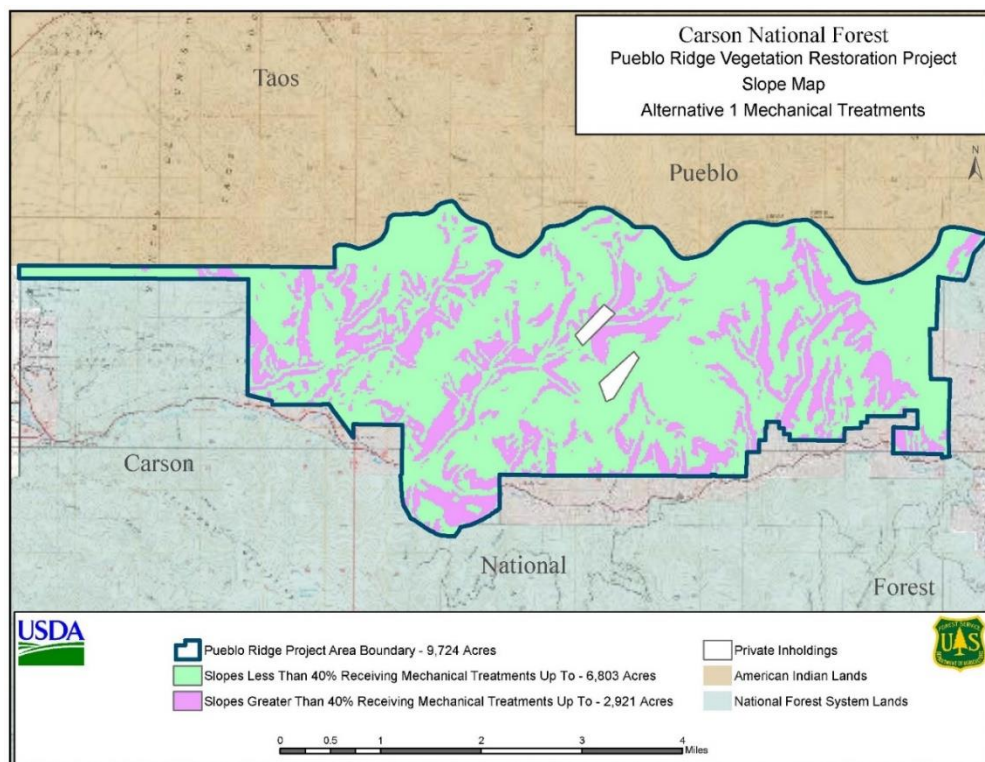


Figure 3. Alternative 1 Slope Map Showing Mechanical Treatments.

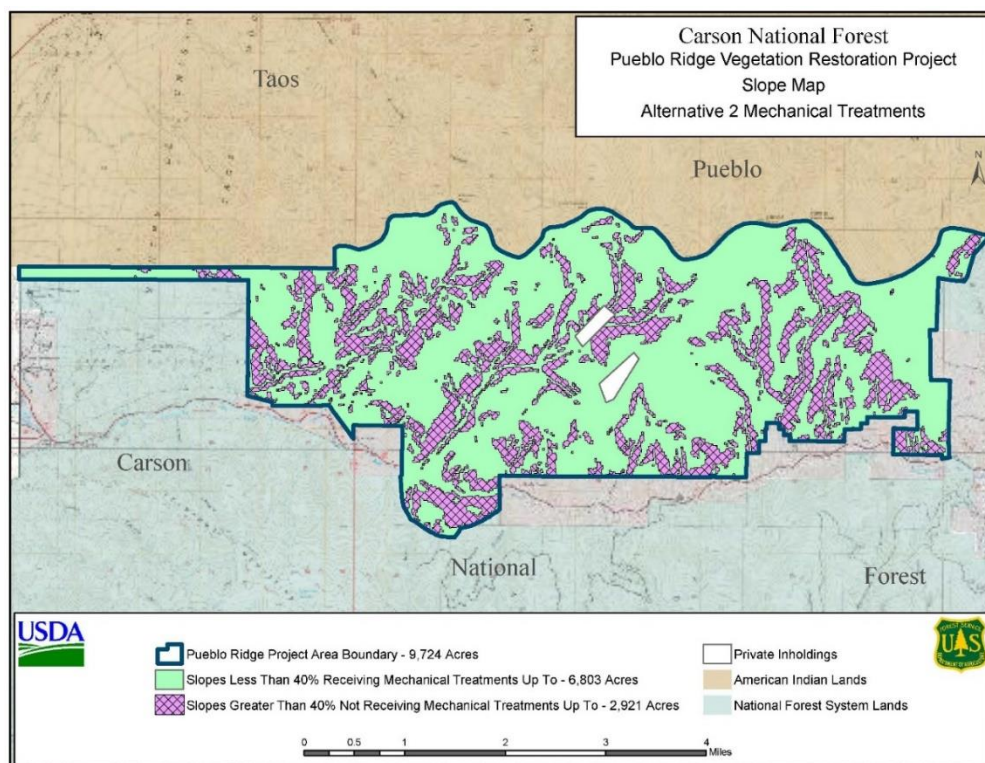


Figure 4. Alternative 2 Slope Map Showing Mechanical Treatments.

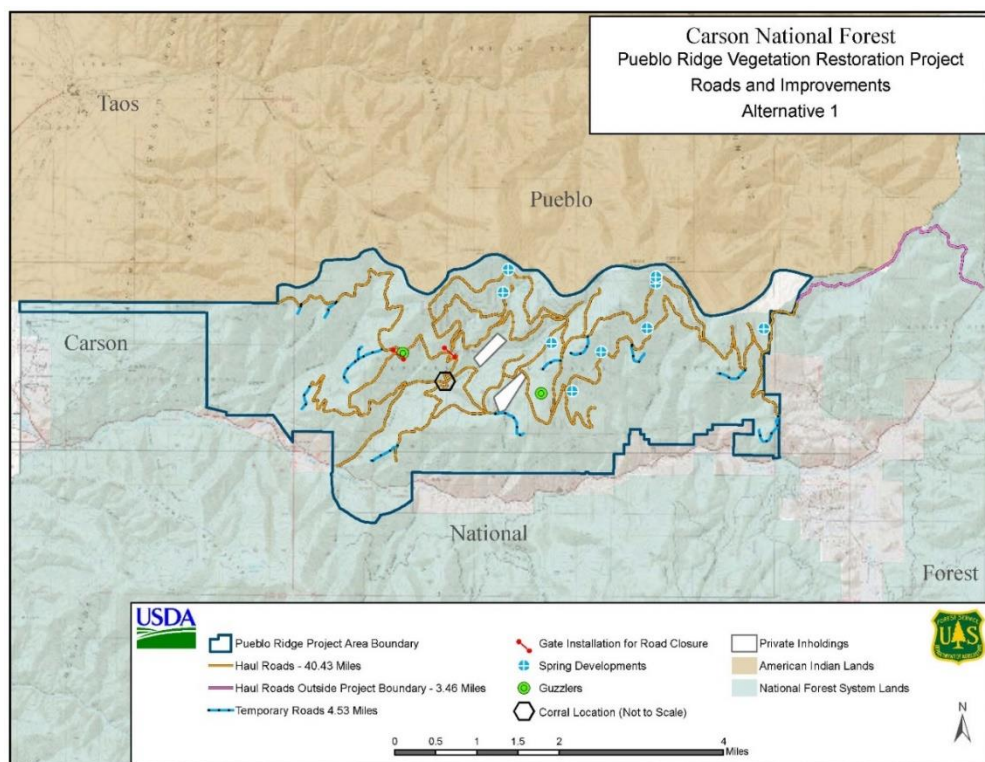


Figure 5. Alternative 1 Roads and Improvements

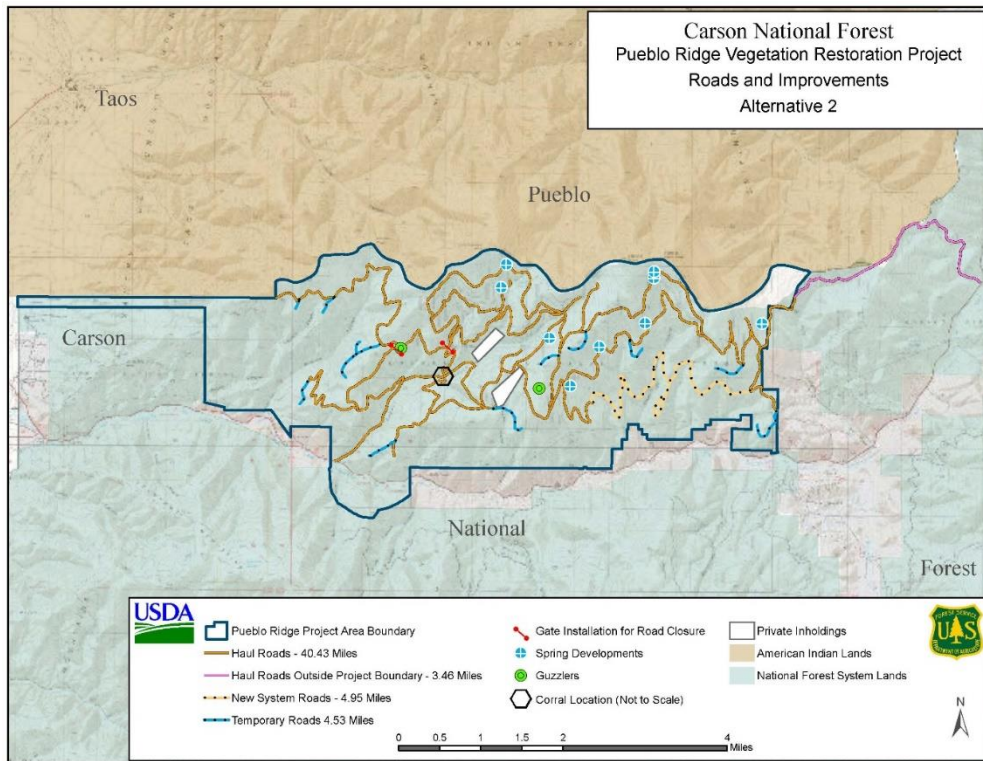


Figure 6. Alternative 2 Roads and Improvements

Comparison of Alternatives

Table 6 displays the actions that differ between alternatives. The acres of mechanical treatment are also included. Instead of a forest plan amendment to allow tracked and wheeled logging equipment to operate on steeper slopes (alternative 1, see **Error! Reference source not found.**), alternative 2 includes 5 miles of new permanent road to allow logging machines with long cables (skyline yarders) to access proposed treatment areas and complete the vegetation treatments as proposed. This means both alternatives could achieve the same amount of vegetation treatment. The analyses in the “Environmental Impacts of the Action Alternatives” section assumes this and discloses the impacts. While alternative 2 assumes all the acres would be treated, the 2,921 acres of slopes greater than 40 percent under alternative 2 (**Error! Reference source not found.**) may not be treated if funds are unavailable to pay for the costs of the new permanent road.

The following actions are the same under both alternatives:

- mechanical treatment on slopes less than 40 percent slope
- hand-thinning with chainsaws and lopping and scattering activity-created fuels, piling activity-created fuels, or both
- limbing leave trees 8 to 10 feet high and cutting understory ladder fuels (shrubs, brush, conifer regeneration) where needed
- commercial Christmas tree sales
- harvesting dead and down fuelwood

- prescribed fire treatments (broadcast, under-burning, jackpot burning, pile burning) and maintenance burning to mimic natural fire return intervals
- temporary road construction
- haul route maintenance
- decommissioning roads
- new guzzlers
- new corral
- riparian restoration and aspen restoration treatments

Table 6. Differences in alternatives

Activities	Alternative 1, Proposed Action, Forest Plan Amendments	Alternative 2, No Forest Plan Amendments
Amendment	Incorporate best available science for restoration in frequent-fire forests (Reynolds et al. 2013), including management direction in the revised Mexican spotted owl recovery plan and clarifying language for northern goshawk management.	No amendment
Amendment	Provide for ground-based steep-slope treatments on slopes greater than 40 percent and less than or equal to 75 percent gradient.	No amendment
Mechanical treatment utilizing conventional ground-based equipment such as feller-bunchers and skidders, conventional non-ground-based equipment (skyline yarders), harvesters and forwarders, masticators, and equipment such as excavators.	9,709 acres (entire project area)	9,709 acres (2,910 acres with slopes greater than 40 percent would rely solely on the proposed road construction and skyline yarders to be mechanically treated)
Mastication treatments (including boom-mounted masticators)	9,709 acres	6,799 acres
Fuelwood availability and treatments (hand thinning)	9,709 acres	6,799 acres
Chipping and biomass mastication in conifer and oak areas (fuel treatment)	9,709 acres	6,799 acres
New permanent road construction	0 miles	5 miles
Spring developments (range improvements)	9	4

Project Design Features

Design features would be incorporated into the project to protect forest resources of soil, water, scenery values, terrestrial and aquatic habitat, and heritage resources. Design features and best management practices would be implemented during the project to limit erosion and sedimentation, reduce impacts to terrestrial and aquatic species, to protect heritage resources, to prevent the introduction and spread of invasive plants, and to protect public health and safety.

General Wildlife

Design Features Common to all Alternatives

- Dead and dying snags would be retained within all treatment units at a ratio of at least 300 snags per 100 acres of suitable timberland, except in areas where they present a risk to human safety.
- Snags could be recruited from disease-free cull or poor-form trees within at least 100 feet of ponds, lakes, springs, seeps, wet meadows, and openings, where appropriate and beneficial to wildlife.
- Known raptor nests (besides Mexican spotted owl, northern goshawk, and peregrine falcon which have species-specific mitigation measures below) would be buffered from mechanical treatments according to forest plan guidance, as amended.
- When designing timber sales, attempts would be made to keep activity perimeters within one major drainage at a time. Subdivision design and contract stipulations (such as requiring the completion of a block before beginning activities in another area of the sale) would be utilized as necessary to minimize impacts on security habitat.
- Sufficient size and length per 100 acres of down logs (where biologically feasible) on 75 percent of suitable timberlands not determined to be highly vulnerable to fuelwood collection would be retained. The guideline includes:
 - Conifers: 12 inch minimum diameter and 5000 linear feet per 100 acres.
 - Aspen: 10 inch minimum diameter and 3300 linear feet per 100 acres.
- Timber sales would be designed so that activity time frames would minimize displacement of wildlife. A primary objective would be to limit logging disturbance in an activity area to no more than three years whenever possible on each timber sale.
- Retain some Gambel oak with diameter at root collar greater than 8 inches where desired for wildlife habitat, unless the retention of these trees compromises the purpose and need of this project.

Mexican spotted owl

- Surveys for presence of nesting Mexican spotted owls would be conducted prior to activities occurring within suitable nesting habitat. If implementation of the project occurs more than five years after the pre-implementation surveys, then an additional one year of survey will be conducted in compliance with the recovery plan, using the accepted protocol prior to

implementation. If owls are detected, consultation with U.S. Fish and Wildlife Service would be reinitiated.

- Surveys and implementation activities can be phased to ensure recent surveys are conducted prior to conducting treatments.
- If owls are detected, then a minimum 600-acre protected activity center would be delineated, which also includes a 100-acre “core” or “activity center” area (Alternatives 1 and 2, respectively). Human activity would be limited or deferred within core areas or established protected activity centers (Alternatives 1 and 2, respectively) from March 1-August 31, if these areas are occupied by owls.
- Road building in protected activity centers should be avoided, unless unavoidable management reasons (e.g. safety concerns) necessitate road construction. Consultation with USFWS would be reinitiated if road construction was deemed necessary inside a protected activity center.
- Within protected activity centers, removal of hardwoods, downed woody debris, snags, and other key habitat variables should occur only when compatible with owl habitat management objectives as documented through reasoned analysis. Otherwise, levels of these materials should be improved or maintained.
- Prescribed fire within protected activity centers (excluding activity center areas in Alternative 2), light burning of surface and low fuels is permitted outside of the breeding season pending review by specialists to ensure habitat protection.

Northern goshawk

- Surveys for presence of nesting northern goshawks would be conducted prior to activities occurring within suitable nesting habitat. If implementation of the project occurs more than five years after the pre-implementation survey, then an additional one year of survey would be conducted prior to implementation. Surveys and implementation activities can be phased over time to ensure surveys are complete before implementation activities begin.
- If an active northern goshawk nest were found in pre-implementation surveys, appropriate management guidelines for habitat disturbance mitigations will be employed, including:
 - Establishment of a post-fledging family area (PFA) of at least 600 acres.
 - Northern goshawk timing restrictions (March 1 – September 30) would be applied to management activities within Post Fledgling Areas (PFA) and nest stands.
 - Trees containing active and alternative nest sites as well as some adjacent trees would be retained.

Design Features Common to Alternative 1

Mexican spotted owl

Management guidelines from the 2012 Mexican spotted owl recovery plan would be followed, which include, but are not limited to:

Core Areas

- Planned or unplanned fires should be allowed to enter core areas only if they are expected to burn at low intensity with low-severity effects.

Protected Activity Centers (PACs) (activities located outside the core area)

- Mechanical treatments would be conducted in up to 20 percent of the total non-core protected activity center area within each Ecological Management Unit (treatments can exceed 20 percent of the non-core acreage within a single protected activity center).

All other areas containing habitat

- Treatments outside of protected activity centers, but within Mexican spotted owl nesting/roosting habitats would retain structural characteristics at or above levels described in **Table**.

Table A. Minimum desired conditions for mixed-conifer forest areas managed for Recovery nesting/roosting habitat

Ecological Management Unit Forest Type	Percent of area ¹	Percent Basal Area by size class		Minimum tree BA ²	Minimum density of large trees ³
		30-46 cm dbh (12-18 in)	>46 cm dbh (>18 in)		
Mixed-conifer (Southern Rocky Mountains)	25	>30	>30	27.5 (120)	30 (12)

¹ % of area pertains to the percent of the planning area, subregion, and/or region in the specified forest type that should be managed for threshold conditions.

² BAs in m²/ha (ft²/acre), and include all trees >1 inch dbh (i.e., any species). We emphasize that values shown are **minimums**, not targets.

³ Trees > 46 cm (18 inches) dbh. Density is tree/ha (trees/acre). Again, values shown are minimums rather than targets. We encourage retention of large trees.

- Prescriptions for treatments outside of protected activity centers, but in forested stands identified as additional nesting/roosting habitat would be designed for attainment of conditions described in Table 2 as quickly as reasonably possible.
- Treatments within Forested Recovery Habitat outside protected activity centers and outside stands managed for nesting/roosting habitat would be designed so that most hardwoods, large snags (greater than 18 dbh), large downed logs (greater than 18 inch diameter at any point), and large trees (greater than 18 inch dbh) are retained, unless this conflicts with safety requirements, forest restoration and/or owl habitat enhancement goals. Treatments adequate to meet fuels and restoration management objectives in Recovery Habitats may result in the short-term loss of some habitat components in areas that could be occupied by spotted owls. Treatments outside of protected activity centers, but within Mexican spotted owl restricted riparian areas would be accomplished through consideration of abundance or deficient of key habitat components for the Mexican spotted owl (such as snags, large downed logs, and/or hardwood trees).

Northern goshawk

- In general, guidelines for treatments are outlined in General Technical Report (GTR)-310 (Reynolds et al.). Some of these guidelines include, but are not limited to:
 - Northern goshawk post-fledging areas (PFAs) should have 10 to 20 percent higher basal area in mid-aged to old tree groups than northern goshawk foraging areas and the surrounding forest. Goshawk nest areas have forest conditions that are multi-aged and dominated by large trees with relatively denser canopies than the surrounding forest.
 - Lop and scatter thinning debris within post-fledging areas and avoid piling debris.
- Design of appropriate treatments outside goshawk post-fledgling family areas would be based on existing cover type and size of stand. Prescriptions will consider desired conditions, including stand composition, structure, and distribution, based on the cover type available both within the treatment unit and across the project area. Desired conditions include:
 - Within ponderosa pine and dry mixed conifer stands, manage over time for uneven-aged stand conditions composed of heterogeneous mosaics of tree groups and single trees, with interspaces between tree groups. The size of tree groups, as well as sizes and shapes of interspaces should be variable. Over time, the spatial location of the tree groups and interspaces may shift within the uneven-aged stand.
 - Tree group spatial distribution in the treatment area may be highly variable based on the local site and current conditions; the interspaces between groups should range from 20 to 200 feet, but generally between 25 and 100 feet from drip line to adjacent dripline. This spacing of groups is not affected by single trees in the interspace.
 - At the landscape scale and mid-scale the number of trees per group and number of groups per area should vary across the landscape. Collectively these stands should aggregate to uneven-aged forest landscapes, similar to natural conditions.
 - In ponderosa pine and dry mixed conifer, snags and coarse woody debris are well distributed throughout the landscape. Snags are typically 18 inches in diameter or greater and average 3 per acre. Coarse woody debris, including logs, may range from 5 to 15 tons per acre. Logs may average 3 per acre within the forested area of the landscape.

Design Features Common to Alternative 2

Mexican spotted owl

Management guidelines from the 1995 Mexican spotted owl recovery plan will be followed, which include, but are not limited to:

Activity Center Area

- No treatments will occur within the 100-acre activity center within a protected activity center.
- Within Protected Activity Centers
 - a. Fuelwood harvesting and fire risk abatement treatments would be utilized within protected activity centers (outside of the no-treatment activity center area) using a

combination of thinning trees less than 9 inches in diameter, mechanical fuel treatment, and prescribed fire.

- b. Commercial timber harvest would be prohibited within established protected activity centers.

All other areas containing habitat

- Treatments outside of protected activity centers, but within Mexican spotted owl protected areas would retain conifers greater than 9 inch in diameter at breast height, hardwood trees greater than 10 inch in diameter at the root collar, snags, large woody debris, and downed logs. Prescriptions will utilize actual conditions as opposed to modeled habitat.
- Treatments outside of protected activity centers, but within Mexican spotted owl restricted areas would retain all trees greater than 24 inch in diameter at breast height, snags 18 inch in diameter, downed logs over 12 inch diameter, and large hardwoods. Prescriptions would utilize actual conditions as opposed to modeled habitat.
- Treatments outside of protected activity centers, but within Mexican spotted owl restricted riparian areas would be accomplished through consideration of abundance or deficient of key habitat components for the Mexican spotted owl (such as snags, large downed logs, and/or hardwood trees).
- At least 170 Basal Area would be retained in the following stands, totaling 390 acres, located outside proposed fuel break units in order to meet 10 percent requirement for restricted habitats:
 - 302044019000033
 - 302044019000038
 - 302044019300013
 - 302044019300021
 - 302044019300024
 - 302044019400021
 - NEW00105
- At least 150 Basal Area would be retained in the following stands, totaling 560 acres, outside proposed fuel break units in order to meet 15 percent requirement for restricted habitat:
 - 302044019000038
 - 302044019200004
 - 302044019200010
 - 302044019300004
 - 302044019400031
 - NEW00063
 - NEW00085
 - NEW00099 (portion of stand outside fuel break)
 - NEW00103
 - NEW00172

Northern goshawk

In general, guidelines for treatments are outlined in the current Forest Plan and include, but are not limited to:

- The PFA would consist of a minimum of 180 acres of nest areas, which consist of both active and alternative nest sites.
- Within an active post-fledging area, high-intensity crown fires would be avoided year-round and the entire home range of the goshawk would not be prescribed-burned within a single year.
- Within nesting areas, outside of the breeding season, a non-uniform thin-from-below approach would be utilized, using hand tools and prescribed fire, in order to reduce fuel loads. Lopping and scattering of thinning debris is preferred if prescribed fire cannot be used. Piling of debris would be limited.
 - Treatments should not reduce canopy cover below minimum thresholds within goshawk foraging areas or within post-fledgling family areas.
 - For the ponderosa pine cover type outside of post-fledging areas: canopy cover for mid-aged forest (VSS 4) should average greater than 40 percent; mature forest (VSS 5) should average greater than 50 percent; and old forest (VSS 6) should average greater than 60 percent.
 - For the ponderosa pine cover type within post-fledging areas: canopy cover for one-third of mid-aged forest (VSS 4) should average greater than 60 percent; canopy cover for two-thirds of mid-aged forest (VSS 4) should average greater than 50 percent; and mature (VSS 5) and old forest (VSS 6) should average greater than 50 percent.
 - For the mixed-conifer cover type within post-fledging areas: canopy cover for mid-aged (VSS 4) to old forest (VSS 6) should average 60 percent.
- In appropriate stands, openings would be established generally ranging from 1/10 to 1/4 of an acre in size within northern goshawk post-fledging areas and not to exceed four acres with a maximum width of 200 feet outside of post-fledging areas.
 - One group of reserve trees of 3 to 5 trees per group would be retained per acre for openings greater than one acre in size.
 - Within the ponderosa pine cover type, retain two snags per acre, three downed logs per acre, and 5-7 tons of woody debris per acre.
 - Within the mixed-conifer cover type, retain three snags per acre, five downed logs per acre, and 10-15 tons of woody debris per acre.

Methodology and Analysis Context

This report utilizes a combination of Forest Geographic Information System (GIS) data, the best available science as found in published literature, Forest Service guidance documents such as general technical reports, natural history websites (e.g. New Mexico Department of Game and Fish BISON-M, NatureServe, and Natural Heritage New Mexico), other specialist reports, and a general familiarity with the area and wildlife to analyze potential project effects on wildlife species and habitat. Existing and post-treatment forest and non-forest stand structures have been determined and calculated based on recently completed silviculture stand exams. These detailed methods are available in the silviculture report (Lowell 2018) although their application to the resource indicators analyzed in this report are outlined in Table.

Table 7. Data utilized to determine the existing conditions within the appropriate scale for each resource indicator.

Resource Indicator	Measure	Data Used	Scale of analysis
Cover/Habitat Type	Acres or stream miles	Local Forest Service Stand exam data FVS Forest Perennial Stream data USFWS wetland inventory	Within project area
Forest Structure – Diameter distribution	Vegetation structural stage classes (VSS)	Local Forest Service Stand Exam data FVS	Within project area
Stand Density	Basal area per acre (ft ² /acre)	Local Forest Service Stand Exam data FVS	Within project area

Assumptions

It is assumed that GIS vegetation data derived from recent stand exams and modeled through Forest Vegetation Simulator (FVS) and used for habitat delineation is reasonably accurate, although some acreage discrepancies may exist and interpretation of forest cover types may sometimes vary. Therefore, on occasion, GIS vegetation layers may not fully represent the forest type or present vegetation accurately.

Habitat is utilized as a proxy for the presence of many species analyzed in this report. If habitat is present, regardless of condition, it is assumed the associated species may potentially utilize the habitat for foraging or breeding.

Effects Analysis Boundaries

The geographic boundary for effects to wildlife and habitat includes all Forest Service administered lands within the Pueblo Ridge project area boundary (approximately 9,818 acres); hereafter referred to as the Project Area. Resource indicators listed within the *Resource Indicators and Measures* section will utilize all acres within this boundary as a representation of existing and post-treatment habitat conditions at the landscape scale (approximately 10,000 acres).

The geographic boundary for cumulative effects for wildlife species and habitat includes all lands within the Pueblo Ridge project area boundary, including all National Forest System lands and private lands, as well as all lands within the Outlet Rio Fernando del Taos and Headwaters Rio Fernando del Taos HUC12 watersheds (Figure 7). The cumulative effects area totals about 46,077 acres. Activities considered for the cumulative effects analysis included all projects that occurred within the project boundary since the year 2000 (Table). It is assumed that cumulative effects for private lands consist of grazing and recreation, both of which are combined with similar effects on National Forest System lands with the exception of federally threatened, endangered, or proposed species.

Table 8. Projects within the Pueblo Ridge Project Boundary on National Forest Service lands that were considered for cumulative effects to wildlife and habitat.

Project Name	Date Decision Signed	Project Type
McGaffey Forest and Rio Grande del Rancho Watershed Restoration	In progress	Watershed restoration*

La Jara Fuels Reduction and Restoration	September 29, 2005	Fuels Reduction, Forest Restoration, and water resource protection**
Francisco Project	December 4, 2008	Fuels Reduction and prescribed burning*
Travel Management on the Camino Real Ranger District	September 27, 2013	Public access**
2014 Green Fuelwood Areas	June 10, 2014	Fuelwood collection and prescribed burning*
2015 Green Fuelwood Areas	September 4, 2015	Fuelwood collection and prescribed burning*
Kit Carson Electric Cooperative Palo Flechado Pass Fiber-optic Installation	September 10, 2015	Utility installation**
2016 Green Fuelwood Areas	June 29, 2016	Fuelwood collection and prescribed burning*
Tri-State Taos to Black Lake Transmission Line Access	November 15, 2016	Transmission Line Access**
Rio Trampas	October 20, 2017	Fuelwood collection and prescribed burning*
Ojos Ryan Landscape Restoration	Reasonably foreseeable	Watershed Restoration**
Dead and dead fuelwood and forest product collection	ongoing	Personal-use permits for collection up to 300' off of open public roads**
Permitted cattle grazing	ongoing	Livestock grazing**

*Projects are in the 6th-code sub watershed boundaries for water quality and terrestrial effects.

**Projects are outside the 6th-code watershed and are in the Upper Rio Grande airshed within the administrative unit (i.e. Camino Real) for air quality effects for particulate matter from prescribed burning or fuel wood availability.

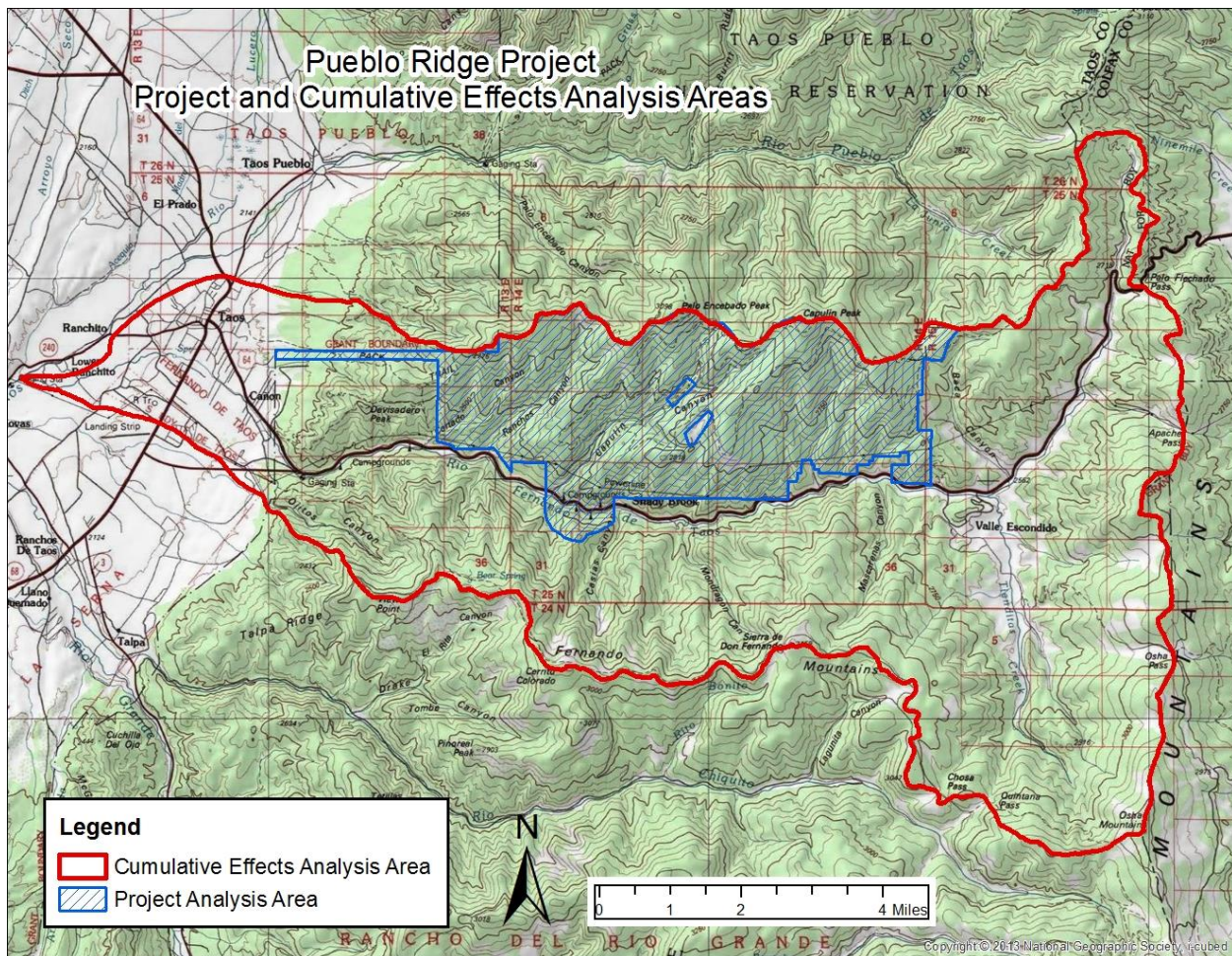


Figure 7. Pueblo Ridge Analysis Area Boundaries

The temporal scale for direct, indirect, and cumulative effects to wildlife and habitat is considered on two scales: short-term (within 10 years) and long-term (more than 25 years). These time frames are appropriate given the activities described in the proposed action and the duration of potential effects to all wildlife species and habitat addressed in this report. It is expected that stand structure in the project area will likely change in 25 years due to project activities, thus potentially effecting wildlife and habitat in the long-term. Repeated maintenance fires may occur after the analysis timeframe; however, species and habitat effects from prescribed fire are disclosed and it is expected the effects of maintenance fires would be similar over time.

Biological Assessment – Threatened, Endangered, and Proposed species being considered

Potential effects of alternatives 1 and 2 on threatened, endangered, and proposed species are analyzed within this section. Federally listed species (**Table**) from the Pueblo Ridge Project Boundary were obtained from the U.S. Fish and Wildlife Service Information, Planning, and Conservation System (IPAC; USFWS 2018). The project area does not contain proposed or designated critical habitat for any federally listed species. There are three potential options for habitat occurrence for each species: present, not

present, or present but not affected. If a species requires further analysis, it will be noted within the table and analyzed within the *Potential for Effects* section.

An effect determination for both alternatives will be made for all species and designated critical habitat within the project area. The effects determinations are as follows:

- No effect: no impacts (positive or negative) to listed species or resource.
- May affect, but not likely to adversely affect: all effects are beneficial, insignificant, or discountable.
- May affect, likely to adversely affect: listed resources are likely to be exposed to the action and will respond negatively.
- May affect, beneficial effect: effects to listed resources are entirely beneficial.

Table 9. Federally listed species considered for the Pueblo Ridge project as of 20 March 2017.

Species	Legal Status	Habitat Occurrence	Comments/Determination
Birds (3)			
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Threatened	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	Endangered	not present	Treatment areas lack dense woody riparian habitat preferred by this species (Sogge et al. 2010). Nearest known occurrence is about 7 miles from the project area. Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Threatened	not present	Treatment areas lack preferred structure of overstory cottonwood trees and contiguous stands of riparian habitat greater than 81 hectares in size (Hughes 2015 and references therein). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Mammals (2)			
Canada lynx (<i>Lynx canadensis</i>)	Threatened	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
New Mexico meadow jumping mouse (<i>Zapus hudsonius luteus</i>)	Endangered	not present	Treatment areas do not contain preferred riparian habitat with dense herbaceous vegetation (BISON-M 2017b). Although some riparian treatments are proposed, the required vegetative habitat does not exist within the riparian areas identified within the treatment areas. This species also prefers lower-elevation riparian areas (<7,600 feet; Frey 2012) and the lowest elevation of the treatment area is 7,100 feet, which is close to the maximum elevation where this species is found. Two historic records of this species were collected in 1858 and 1958 on what is currently the Camino Real Ranger District and private inholdings, but no specimens have been recently found despite surveys (Frey 2012). Due to the lack of habitat and the unlikely occurrence of this species within the project area, alternatives 1 and 2 would have <u>no effect</u> on this species.

Species	Legal Status	Habitat Occurrence	Comments/Determination
Designated or Proposed Critical Habitats	NA	Not present	No designated or proposed critical habitats occur within the project area.

Potential for Effects

The following species require further analysis:

Mexican spotted owl

Canada lynx

Mexican Spotted Owl (MSO)

The U.S. Fish and Wildlife Service revised the Mexican Spotted Owl Recovery Plan in 2012 and terminology for MSO habitat was updated from the 1995 Recovery Plan. However, planning and implementation related to this analysis will follow terminology and standards and guidelines from the 1995 Recovery Plan or the 2012 Recovery Plan, depending on the selected alternative. The 1995 Recovery Plan is consistent with the 1996 amendment to the Carson National Forest Plan (USFS 1986) and will be used until the Carson National Forest Plan is revised unless Alternative 1 is selected, which modifies the Forest Plan for the Pueblo Ridge Project to use guidance in the 2012 Recovery Plan. The survey protocol remains the same for both the 1995 and the 2012 recovery plan. The three categories of Mexican spotted owl habitat are described below. For comparison purposes, differences in language between the 1995 and 2012 Recovery Plans are included.

In the 1995 Recovery Plan (USFWS 1995), protected habitat consists of areas that are occupied nest or roost areas, areas with a slope greater than 40 percent in mixed conifer and pine-oak forests where timber harvest has not occurred in the past 20 years, and administratively reserved lands (USFWS 1995). In the 2012 Recovery Plan, protected habitat areas are defined as Protected Activity Centers which refer to areas that encompass a minimum of 600 acres surrounding known owl nest/roost sites. Alternative 1 utilizes parameters outlined in the 2012 Recovery Plan to delineate existing suitable nesting/roosting habitat, which is referred to as “suitable nesting/roosting habitat”. Acres of protected habitat within treatment areas is modeled using the definition in the 1995 recovery plan for Alternative 2

In the 1995 Recovery Plan, restricted habitat consists of areas outside of the PACs which have potential nesting or roosting areas and foraging, dispersal, and wintering habitats (USFWS 2012). It consists of habitats such as pine-oak, mixed-conifer, and riparian areas (USFWS 1995). It was renamed “recovery habitat” in the 2012 Recovery Plan, but the attributes did not change. However, a clearer description of riparian and forested recovery habitat was provided (USFWS 2012). For purposes of this analysis, “restricted habitat” will be used in lieu of “recovery habitat” in Alternative 2.

In the 1995 Recovery Plan, the last category consists of other forest and woodland types. This includes ponderosa pine and spruce-fir forests, pinyon-juniper woodlands, and aspen (*Populus* spp.) groves that appear to be little used by nesting Mexican spotted owls but are likely used for foraging and dispersal (USFWS 1995). In the 2012 Recovery Plan, other forest and woodland types are defined as those areas consisting of vegetation types that are neither restricted or within Protected Activity Centers (USFWS 2012). There are no specific management guidelines for this habitat.

Species Description

In general, Mexican spotted owls will nest, roost, forage, and disperse in a wide variety of habitats from rocky canyons to piñon/juniper woodland to spruce/fir depending on the geographic region. However, roosting and nest habitats are generally in late seral forests with mature trees or in rocky canyon areas (USFWS 2012) in mature mixed-conifer or mature ponderosa pine forests (Ganey et al. 2011; USFWS 2012). Forests used for nesting are generally uneven-aged, multistoried, and have high canopy cover (USFWS 2012). In rocky areas, Mexican spotted owls will nest and roost in protected caves or sheltered ledges (USFWS 1995). In northern New Mexico, Mexican spotted owl nest and roost sites are usually associated with steep-walled and relatively narrow canyons, high canopy cover, saplings in the understory, and rocky outcrops (USFWS 2012). Timing of breeding is range-dependent, but generally consists of courtship occurring in March, followed by eggs in late March or early April and hatching in May. Owlets fledge early-to-mid June (USFWS 2012). Fidelity to breeding sites is very high and most owls return to the same territory year after year (USFWS 2012).

Research is limited on foraging habitat because it is difficult to observe foraging behavior of this species at night. However, Mexican spotted owls appear to use a wider variety of cover types with more varied structure for foraging compared to nesting and roosting habitats (Ganey et al. 2003; USFWS 2012). Mexican spotted owls will forage in all roosting habitats but will not roost in all forested stands in which they forage (Ganey et al. 2003; USFWS 2012). Habitats used for foraging vary from forested, riparian, and meadow habitat types, including areas burned from fire, and cliff faces and terraces between cliffs (USFWS 2012). In general, forested foraging areas consist of closed-canopy forests with high basal area and a high volume of logs (USFWS 2012). Their diet varies by geographic location, but they will consume small- and medium-sized mammals such as woodrats, mice, and voles as well as rabbits, bats, birds, reptiles, and insects (USFWS 2012). The prey species listed above have habitat needs varying from rock outcroppings and high shrub components (woodrats and chipmunks), to high herbaceous cover (rabbits), to high tree densities (red squirrels) and areas of exposed soil (deer mice).

Threats to this species and its habitat include stand-replacing wildfire, vegetation treatments (such as wildland-urban interface treatments and silvicultural treatments), insect and disease infestation, grazing, and land and transportation development (USFWS 2012).

Affected Environment

There are no known occurrences or designated PACs within either the Pueblo Ridge treatment areas or the project boundary. The nearest PAC is located on the Santa Fe National Forest, approximately 31 miles to the south of the Pueblo Ridge Project Area. During a region-wide occupancy survey conducted by Bird Conservancy of the Rockies, there was a single owl detected in 2016 (unknown sex) and 2018 (male), respectively, approximately 1.5 miles south of the Pueblo Ridge project boundary. Forest Service biologists conducted a follow-up survey after each detection within the respective year during which no additional owls were detected and no breeding was confirmed.

Approximately 4,141 acres (41 percent) of the Pueblo Ridge project area were surveyed for MSO in 2015 as part of the Tri-State, Hernandez to Black Lake Transmission Line Access Project. No owls were detected during the two-year protocol survey. The first year of surveys totaling 3,854 acres in the northern section of the Pueblo Ridge project area were completed in 2019 (Figure 8). No spotted owls were located. Mexican spotted owl survey coverage within the project area from 2015 through 2019 totals 6,886 acres.

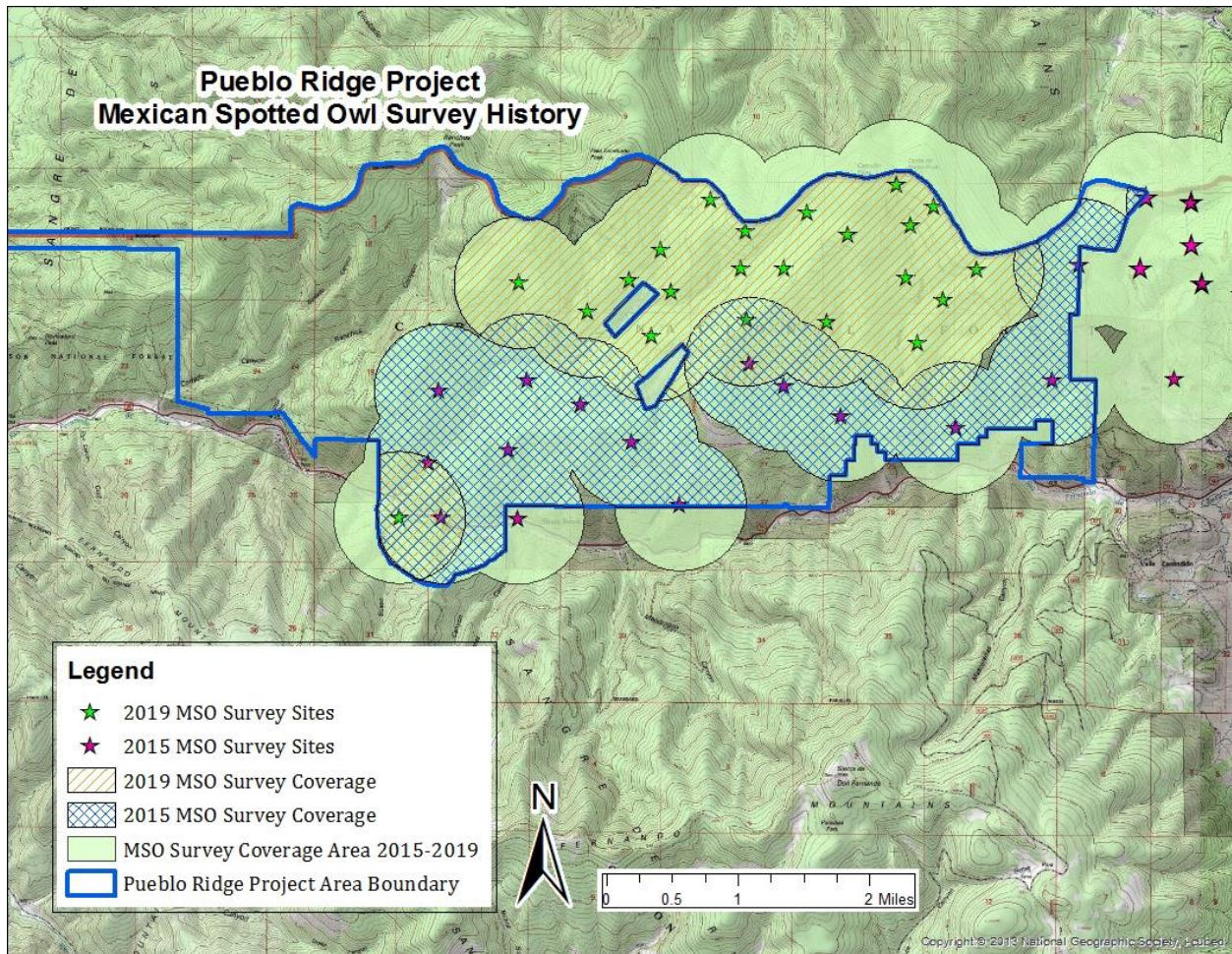


Figure 8. Mexican spotted owl survey history, Pueblo Ridge project area

Approximately 3,855 acres of mixed conifer exist within the project area. Existing VSS distribution for mixed conifer in the project area is largely dominated by moderate to dense stands in medium size classes with nearly 64% of mixed conifer occurring in stands from 5 to 18 inches diameter with canopy cover 60 percent or greater (3C, 4B, and 4C VSS classes; Table 10). Less than 85 acres (5%) of mixed conifer consists of dense stands in size classes 18 inches diameter or greater (VSS 5C, 6C; Trees < 18 inches dbh, canopy cover ≤60%) described by Ganey et al. (2003) as meeting Mexican spotted owl nesting habitat structural requirements in mixed conifer (Table 10). By comparison, the Carson National Forest contains an estimated 8,500 acres of stands with diameters 20 inches or greater, 60 percent or greater canopy, in mixed conifer.

Table 10. Mixed conifer VSS within the project area

VSS	Acres	% of Existing Mixed Conifer
1	138	3.6
2	0	0
3A	124	3.2
3B	395	10.2

3C	529	13.7
4A	0	0
4B	993	25.8
4C	945	24.5
5A	14	0.4
5B	503	13.0
5C	44	1.1
6A	0	0
6B	131	3.4
6C	39	1.0
TOTAL	3,855	100.0

Alternative 1

Management of Mexican spotted owl habitats under this alternative prescribes to recommendations provided in the 2012 Mexican Spotted Owl Recovery Plan (Recovery Plan, USFWS 2012). Suitable habitat for this species is modeled in terms of parameters of mixed conifer stands described in the 2012 Mexican Spotted Owl Recovery Plan and existing and potential nesting/roosting habitats were identified according to the amounts and structural characteristics in Table C.3 of the Recovery Plan, shown below in Table A.

Table A. Minimum desired conditions for mixed-conifer and pine-oak forest areas managed for Recovery nesting/roosting habitat.

EMU(s) Forest Type	% of area ¹	% BA by size class		Minimum tree BA ²	Minimum density of large trees ³
		12-18 in dbh	(>18 in dbh		
CP, UGM, SRM, BRW Mixed-conifer	25	>30	>30	120 ft	12

1. % of area pertains to the percent of the planning area, subregion, and/or region in the specified forest type that should be managed for threshold conditions.
2. BAs in ft²/acre, and include all trees >1 inch dbh (i.e., any species).
3. Trees > 18 inches dbh. Density is tree/ha (trees/acre).

Approximately 562 acres (14% of existing mixed conifer within the project area) consists of suitable nesting/roosting habitat in the project area. Because this amount represented less than 25% of existing mixed conifer in the project area as recommended in the 2012 Recovery Plan, an additional 679 acres (18 percent of mixed conifer) containing habitat attributes nearest those prescribed in Table 10 were identified for management to develop suitable nesting/roosting habitat as quickly as possible to meet the 25 percent recommendation (Figure 9). Stands identified for management as nest/roost habitat equate to about 32% of existing mixed conifer. Approximately 2,614 acres of recovery habitat constitutes the remaining mixed conifer stands.

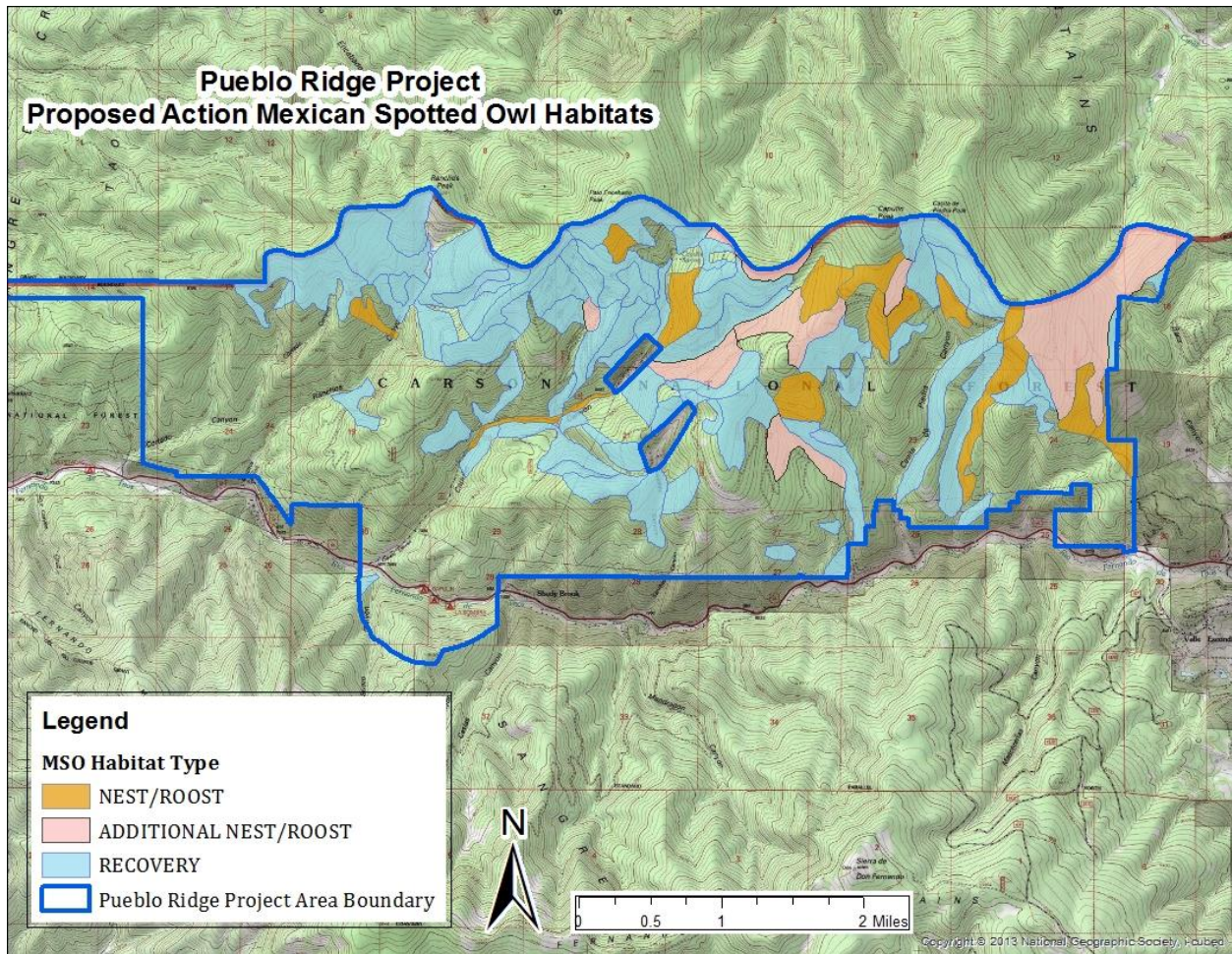


Figure 9. Mexican spotted owl habitat according to the 2012 Recovery Plan, Pueblo Ridge Project Area.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Vegetation and fuels treatments described in Table 5 may be applied within 562 acres of nest/roost habitat; however, stand structural attributes (described in Table 11 as meeting minimum thresholds for nesting/roosting habitat suitability) would be maintained post-treatment for all 562 acres. These same activities may also be implemented within additional nest/roost stands. Because the acreage amount of stands delineated for management as suitable habitat (32 percent of existing mixed conifer) exceeds the 2012 Recovery Plan recommendation of 25 percent, management of additional nest/roost stands to obtain suitable habitat characteristics described in Table 10 as soon as possible would be required on 402 acres of additional nest/habitat. Management toward suitable habitat characteristics on 277 acres of additional nest/roost habitat would be optional, thereby allowing management flexibility in selecting the location of stands to be managed at higher densities (i.e., toward nest/roost characteristics) to meet 2012 Recovery Plan recommendations while meeting the purpose and need identified for reducing wildfire risk, particularly within fuel break units.

Management of Mexican spotted owl habitats consistent with 2012 Recovery Plan recommendations is expected to result in adequate availability of suitable habitat that is sustainable over time. However, as noted by Ganey et al. (2016), there may be some risk in omitting consideration of canopy cover in evaluating suitable Mexican spotted owl nesting/roosting habitat. While stands identified as nesting/roosting and additional nesting roosting stands within the project would meet suitable habitat attributes for basal area and trees per acre as defined in the 2012 Recovery Plan, residual stand canopy cover values would range from 50 to 58%, which falls below recommendations of 60% (Ganey et al. 2003).

About 150 acres of spotted owl nest/roost and 278 acres of additional nest/roost habitat (34 percent of all nest/roost and additional nest/roost) occurs within proposed fuel break treatment units. Because these treatment prescriptions are designed to reduce fire spread within the project area, these treatments are expected to benefit spotted owl habitat overall by reducing risk of loss to stand replacement fire both for these units and nesting/roosting habitats outside these units. As stated above, an excess of 277 acres of additional nest/roost habitat exists allowing management the option of adjusting treatment type in order to reduce wildfire risk where these stands overlap fuel break units. Vegetation and fuels treatments in spotted owl recovery habitats, while reducing canopy cover and basal area, would adhere to management recommendation in the 2012 Recovery Plan. Treatments would retain stand attributes contributing to the potential for development into future nesting/roosting habitat while accelerating stand development and reducing the potential for stand replacement fire and loss of key attributes including large trees and snags. Approximately 1,600 acres of recovery habitat overlaps with proposed fuel break treatment units where prescriptions may involve removal of some trees greater than 18 inches in order to meet the purpose and need of the project. The 2012 Recovery Plan recognizes that treatments adequate to meet fuels and restoration management objectives in recovery habitats may result in the short-term loss of some habitat components in areas that could be occupied by spotted owls, and that these losses are acceptable where they result from actions that otherwise further longer-term protection and sustainability of forests occupied by owls. Implementation of fuel break prescriptions is expected to reduce risk of losing existing nesting/roosting habitats to stand replacement fire by reducing risk of fire spread within the project area. Therefore, the project retains a sufficient balance of density and distribution of important features that spotted owls may require while reducing the risk of losing existing roosting and nesting habitat from stand-replacing fires.

The project area currently contains no known spotted owl protected activity centers (PACs) or individual spotted owl occurrences, although comprehensive surveys have not been conducted over the entire project area. Prior to implementation of management activities, protocol surveys for spotted owls will be conducted in all potentially suitable habitats. If spotted owls are determined to occur, management recommendations concerning core areas and protected activity centers as outlined in the 2012 Recovery Plan would be implemented in order to maintain/enhance suitable habitat and reduce risk of disturbance (see *Design Features* section above). Any potential negative effects to nesting owls or their habitat due to noise would be avoided by means of management guidelines and project design. During the non-nesting period, owls or prey individuals occurring within or adjacent to treatments would likely move out of the disturbed area into adjacent, undisturbed habitat. This disturbance would be short-term and localized in nature. Thus while the foraging behavior of individual owls and prey may temporarily be affected by project activities, their overall ability to feed, reproduce, nest, roost, and conduct other life-history behaviors would not be permanently adversely impacted, so this temporary disturbance is considered insignificant and discountable.

No new system roads would be created under this alternative. Reroute of existing system roads and temporary road construction of up to 5 miles would occur during implementation to allow access to

thinning units. Use of temporary roads could increase disturbance during project implementation if owls are nearby during the nesting season. However, the risk is low because suitable habitats would be surveyed for owls prior to implementation and areas around positive owl sites would be restricted by a limited operating period. The temporary roads would be decommissioned once the project is completed. Decommissioning of up to 13 miles of closed roads under the Proposed Action would limit illegal trespass via motorized means and provide an indirect benefit by reducing potential disturbance.

Other proposed activities including restoration treatments, road management, and range improvements, are expected to have minimal impacts on existing spotted owl habitat. If owls are determined present within the project area, project design criteria would apply to minimize risk of disturbance and impacts to habitat.

Alternative 2

Direct and Indirect Effects

Approximately 1,836 acres of protected habitat and 4,462 acres of restricted habitat mapped within the project area could be affected by project activities. This represents approximately about 4 percent and 7 percent, respectively, of protected and restricted habitat within the Camino Real Ranger District (table 11).

Table 11. Protected and restricted Mexican spotted owl habitats

Forest Type	Mexican spotted owl suitable habitat type	Acres within project boundary	Acres within district boundary	Percentage of habitat in Camino Real Ranger District
Mixed Conifer	protected	1,836	41,963	4%
	restricted	4,462	60,441	7%

There is currently an overabundance of trees within the VSS 3 and VSS 4 ages classes, which indicates there is a departure from preferred spotted owl habitat of mature and seral trees (trees within and greater than the VSS 4 size class). In addition, the current conditions indicate that stand structure is relatively even with fewer trees represented on the landscape in the small (less than 4.9 inches dbh) and larger (greater than 18 inches dbh) VSS size classes.

Treatment prescriptions protected habitats would adhere management guidelines described in the Forest Plan consisting of restricting thinning treatments to trees 9 inches dbh and retention of woody debris larger than 12 inches and trees and snags greater than 10 inches in diameter. Treatments would retain 170 square feet of basal area in 10% of restricted habitats (approximately 390 acres) as well as 150 square feet of basal area in an additional 15% of restricted habitats (approximately 560 acres). A minimum of 20 trees/acre 18 inches or larger would be retained, as would 10% of existing stand density index for each of diameter size classes 12-18 inches, 18-24 inches, an 24 inches or greater. In addition, treatments would remain consist with Forest Plan direction by incorporating natural variation in tree density, incorporating uneven-aged management, maintaining represented species, retaining trees 24 inches or greater dbh, and utilizing prescribed fire, as well as emphasizing adequate snag, down log, and hardwood retention.

The project area currently contains no known spotted owl protected activity centers (PACs) or individual spotted owl occurrences, although comprehensive surveys have not been conducted over the entire project

area. Prior to implementation of management activities, protocol surveys for spotted owls will be conducted in all potentially suitable habitats. If spotted owls are determined to occur, management recommendations concerning core areas and protected activity centers as outlined in the Forest Plan would be implemented in order to maintain/enhance suitable habitat and reduce risk of disturbance (see *Alternative 2 Design Features* section above). Any potential negative effects to nesting owls or their habitat due to noise would be avoided by means of management guidelines and project design. Any present foraging owls or prey individuals outside of areas with disturbance restrictions would likely move out of the disturbed area into adjacent, undisturbed habitat. This disturbance would likely be short-term and localized in nature and would likely only occur during project activities. Thus the foraging behavior of individual owls and prey may be affected by project activities, although their overall ability to feed, reproduce, nest, roost, and conduct other life-history behaviors would not be permanently adversely impacted, so this temporary disturbance is considered insignificant.

Up to 5 miles of new system road would be created under this alternative for which access would be managed as maintenance level 1 (closed) after project implementation is completed. Therefore, potential increase in disturbance if nesting owls become established in the vicinity would be short-term. Reroute of existing system roads and temporary road construction of up to 5 miles would occur during implementation to allow access to thinning units. Use of temporary roads could also increase disturbance during project implementation if owls are nearby during the nesting season. However, the risk is low because suitable habitats would be surveyed for owls prior to implementation and areas around positive owl sites would be restricted by a limited operating period. The temporary roads would be decommissioned once the project is completed.

Decommissioning of up to 13 miles of closed roads under both action alternatives would limit illegal trespass via motorized means and provide an indirect benefit by reducing potential disturbance.

Other proposed activities under alternative 2 including restoration treatments, road management, and range improvements, are expected to have minimal impacts on existing spotted owl habitat. If owls are determined present within the project area, project design criteria would apply to minimize risk of disturbance and impacts to habitat.

Approximately 20 percent (379 acres) of the mixed-conifer habitat within the project boundary was designated as old-growth allocation in accordance to the Forest Plan. Within this allocation, there are 221 acres and 107 of Mexican spotted owl protected and restricted habitat, respectively. Treatments in protected habitats would retain existing overstory density and stand suitability while reducing understory densities. Treatments in restricted habitat may reduce stand densities below threshold of suitability, if it currently exists, by reducing stand densities.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the Mexican spotted owl and its habitat. As a species with specific nesting and roosting requirements but more flexible foraging habitat, areas outside of protected and restricted habitat were considered. These activities include grazing, recreation, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, the Capulin, Fernandez, East Fernandez, and Tienditas allotments are active within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past

before grazing management by the Forest Service likely altered plant species composition and reduced the amount of riparian and grassland habitat available. Historical grazing would have had a negative effect on the Mexican spotted owl due to the loss of prey species, changes to timber stand structures and removal of fuels for natural wildfires. Currently, grazing is actively managed and some site-specific riparian areas or prey habitat with herbaceous cover could still be negatively impacted. Additional sunlight from tree removal and prescribed fire would encourage the growth of ground cover which is often used as forage for cattle and as forage and cover for prey species for the Mexican spotted owl.

It is reasonable to assume recreational activities (such as camping, hiking, horseback riding, and hunting, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance is likely short-term because project and recreation activities would not occur without interruption for extended periods of time. If owls or prey individuals are present, they would likely relocate to adjacent, undisturbed habitat and would return when recreation and project activities cease.

Timber stands adjacent to treatment areas containing suitable Mexican spotted owl habitat have been altered by previous and current timber, fuelwood, and prescribed fire projects. These projects are listed in Table 7. District-wide dead and down permits and latilla permits may also change stand composition and the amount of downed logs that contributes to Mexican spotted owl and prey species habitat. These combined activities likely opened the canopy and increased grass and shrub availability to owl prey species. The improved stand condition and forest health resulting from these treatments within the cumulative effects analysis area likely has a cumulative benefit to the owl, unless excessive downed wood is harvested or many large, mature trees are poached within designated fuelwood units. In addition, these treatments contribute to an overall improved resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy habitat for this species.

The combination of grazing, recreation, and other activities may have an incremental effect on the Mexican spotted owl by potentially displacing foraging owls or prey species and reducing potential habitat for prey. However, spotted owl ability to conduct life-history behaviors would not be adversely impacted, so cumulative effects are considered insignificant.

Determination

Due to the limited temporary negative effects on habitat or individuals and the likelihood, reduction in risk of habitat loss to stand replacement fire, and consistency with management recommendations contained in the 2012 Recovery Plan of improved habitat quality after implementation activities, alternatives 1 and 2 may affect, but are not likely to adversely affect the Mexican spotted owl.

Canada Lynx

Species Description

Lynx habitat in the Southern Rockies, including northern New Mexico, is characterized by Engelmann spruce and subalpine fir forest above 9,000 feet in elevation (Interagency Lynx Biology Team 2013; USFWS 2014a). These higher-elevation spruce/fir forests are habitat for snowshoe hare, the primary prey item for lynx (Interagency Lynx Biology Team 2013; USFWS 2014a).

Lynx historically occurred in Colorado, but it is uncertain if they also occurred in New Mexico (Interagency Lynx Biology Team 2013). Lynx were reintroduced to Colorado from 1999 to 2006, including into the San Juan Mountains in southern Colorado. Radio-collar data shows that some of these reintroduced lynx range into northern New Mexico (Interagency Lynx Biology Team 2013). Habitat in

and around the project area is part of the southern end of the San Juan Mountains and is more or less an extension of suitable lynx habitat located in Colorado. However, the overall conditions in northern New Mexico are not adequate to support a self-sustaining population of lynx (Interagency Lynx Biology Team 2013). For instance, snowshoe hare are present, but much less abundant, and snowpack is less persistent than in Colorado (Interagency Lynx Biology Team 2013).

According to the 2014 Revised Designation, lynx from Colorado may disperse into northern New Mexico; however, habitats are not likely to support a self-sustaining population (USFWS 2014a). An earlier analysis of extending protection for lynx to New Mexico concluded that management of suitable lynx habitat in New Mexico should aim to support dispersing individuals long enough for their return to more suitable habitat in Colorado (USFWS 2009).

Affected Environment

Patches of suitable lynx habitat are present (spruce/fir forest above 9,000 feet in elevation); however, patches are relatively small and fragmented compared to the much larger aggregations that are needed to support breeding female lynx (USFWS 2014a). Furthermore, a study from Colorado found that reintroduced lynx were selecting den sites, on average, above 11,000 feet in elevation (Interagency Lynx Biology Team 2013), approximately 600 feet higher than any high point in and around the Pueblo Ridge project area.

The guidance in the Revised Designation for Canada Lynx (USFWS 2014a) clearly defines essential habitat for conserving lynx as having high densities of snowshoe hare, persistent snow pack, and being large enough to support multiple female lynx home ranges, which average 29 square miles (18,560 acres) in Colorado (USFWS 2014a). Potentially suitable habitat within the project area consists of 51 acres of spruce-fir forest; therefore, the project area is unlikely conducive to supporting Conditions in the project area lack attributes that approach these criteria, but they do not fully meet these criteria. In particular, areas with suitable stands of spruce/fir above 9,000 are relatively small (several stands totaling 51 acres) and fragmented, and cover much less area than what is necessary to support even one female lynx home range.

The northeast portion of the project area contains approximately 51 acres of potential lynx habitat in Engelmann spruce forest cover type (Figure 11). No historical or recent lynx observations have been reported within 10 miles of the project area boundary. The project area is located approximately 60 miles from the nearest extant lynx population in Colorado. No mapped lynx LAUs or linkage areas occur within the project area.

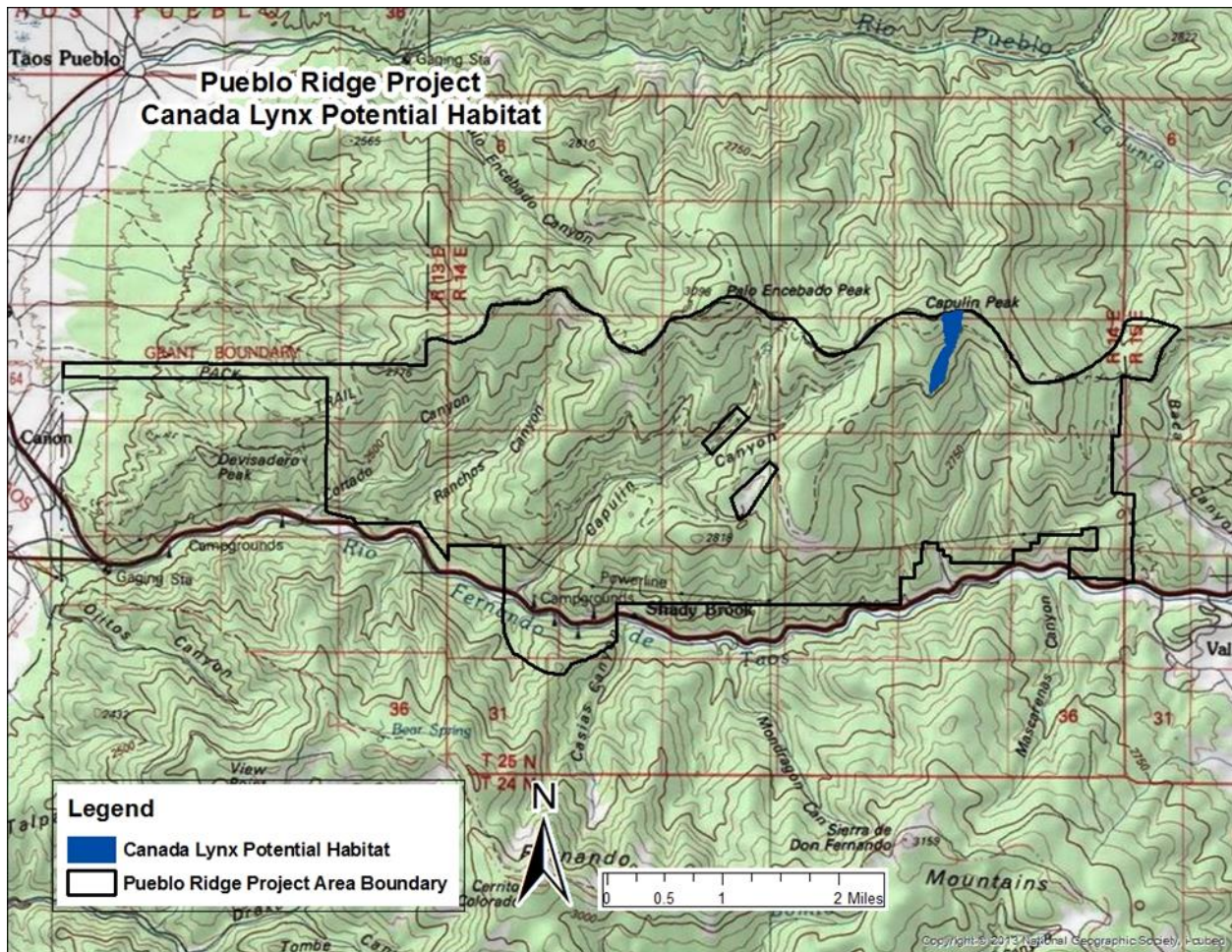


Figure 11. Canada lynx potential habitat, Pueblo Ridge Project Area

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

The actions under both alternatives include treatments in lynx habitat (spruce/fir forest types). Treatments in the 4 units containing the spruce cover type include aspen restoration, thinning from below to 40% canopy closure, and thinning from below to 120 square feet of basal area. Treatments will reduce overstory cover and understory density within stands, thereby reducing the potential to support lynx prey species such as snowshoe hare and red squirrel. However, retention of canopy cover in excess of 30% for all units will likely retain adequate cover to support lynx movements through the area. Portions of these units are located within the northern fuel break along the boundary with Taos Pueblo lands. While habitat quality will be reduced, treatments are expected to reduce the potential from fire spread and potential for stand replacement fire from the project area into more suitable spruce stands on north-facing aspects north of the project area (see Fuels Specialist Report). It is possible that individual lynx, dispersing into New Mexico from Colorado, may be present in the project area. Disturbance from project activities may temporarily affect these local, dispersing individuals by displacing them from the project area, but overall

the effects would be insignificant and would not result in any measureable changes to lynx behavior. Actions would not affect an individual's ability to seek food, cover, shelter, reproduce, or move through the project area, thus proposed actions in either alternative would not adversely impact this species.

No new system roads would be created under alternative 1. Reroute of existing system roads and temporary road construction of up to 5 miles would occur during implementation to allow access to thinning units. Use of temporary roads could increase disturbance during project implementation in the unlikely event that lynx are nearby, but the effect likely consist only of temporary displacement during implementation. Temporary roads would be decommissioned once the project is completed.

Under alternative 2, up to 5 miles of new system road would be created under this alternative. However, this route would be located at lower elevations outside potential lynx habitat. Reroute of existing system roads and temporary road construction of up to 5 miles would occur during implementation to allow access to thinning units. Use of temporary roads could also increase disturbance during project implementation if lynx happen to be in the vicinity, but the effect would be short-term. Temporary roads would be decommissioned once the project is completed.

Decommissioning of up to 13 miles of closed roads under both action alternatives would limit illegal trespass via motorized means and provide an indirect benefit by reducing potential disturbance.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the Canada lynx and its habitat. These activities include grazing, recreation, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, the Capulin, Fernandez, East Fernandez, and Tienditas allotments are active within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition and reduced the amount of riparian habitat available. Historical grazing would had a negative effect on lynx due to the loss of prey species, changes to timber stands structures and removal of fuels for natural wildfires. Currently, grazing is actively managed and some site-specific prey habitat with herbaceous cover could still be negatively impacted.

It is reasonable to assume recreational activities (such as camping, hiking, horseback riding, and hunting, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance is likely short-term because project and recreation activities would not occur without interruption for extended periods of time. If lynx or prey individuals are present, they would likely relocate to adjacent, undisturbed habitat and would return when recreation and project activities cease. The combination of grazing, recreation, and other activities may have an incremental effect on the Canada lynx by potentially displacing dispersing lynx or prey species and reducing potential habitat for prey. However, lynx ability to conduct life-history behaviors would not be permanently adversely impacted, so cumulative effects are considered insignificant.

Determination

The action alternatives may reduce habitat suitability on 51 acres and temporarily alter the behavior of individual lynx temporarily dispersing from Colorado to New Mexico. However, there is no evidence of

lynx occurrence or potential for home range persistence in the project area. In addition, treatments on 51 acres will not affect lynx movements at the landscape level. Therefore, the effects of the proposed action are likely insignificant or discountable for the Canada lynx; thus the proposed actions in both alternative 1 and 2 may affect, but are not likely to adversely affect the Canada Lynx.

Biological Evaluation - USDA Forest Service, Region 3: Forest Service Sensitive species being considered

Forest Service sensitive species for the Camino Real Ranger District on the Carson National Forest (**Table**) were obtained from the Regional Forester's list of sensitive plants and animals, signed September 2013 (USFS 2013). Of the 35 Forest Service sensitive species on the Carson National Forest, 26 occur within the Camino Real Ranger District and are analyzed for this project. There are three potential options for habitat occurrence for each species: present, not present, or present but not affected. If a species requires further analysis, it will be noted within the table and analyzed within the *Potential for Effects* section.

An effect determination for both alternatives will be made for all Forest Service sensitive species. The effects determinations are as follows:

- No effect: no impacts (positive or negative) to listed species or resource.
- Beneficial effect: effects to a species or resource are entirely beneficial
- May affect but is not likely to result in a trend toward listing or a loss of viability: individuals or their habitats are likely exposed to the action, but effects are beneficial, insignificant, or discountable and the species or resource as a whole will persist.
- May affect and is likely to result in a trend toward listing or a loss of viability: species or resources are likely to be exposed to the action and will respond negatively and populations would decrease as a result.

Table 12. Forest Service Forest sensitive species for the Camino Real Ranger District.

Species	Habitat Occurrence	Comments/Determination
<i>Amphibians (1)</i>		
Northern leopard frog (<i>Lithobates pipiens</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
<i>Birds (7)</i>		
Bald eagle (<i>Haliaeetus leucocephalus</i>)	not present	Preferred habitat of large roosting trees near water and open bodies of water do not occur within the treatment areas (BISON-M 2017c). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Northern goshawk (<i>Accipiter gentiles</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
American peregrine falcon (<i>Falco peregrinus anatum</i>)	not present	The project area lacks suitable nesting habitat and no active nest sites are known to occur within 10 miles of the project area. Only one observation has been reported in the project area (a deceased peregrine, 2015) was reported. Due to a lack of nesting habitat, primary forage habitat, and more than one species occurrence report, peregrine falcon occurrence within the project area is likely only incidental. Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
white-tailed ptarmigan (<i>Lagopus leucurus</i>)	not present	Treatment areas occur below alpine tundra habitat (10,500 feet) as required by this species (BISON-M 2017d). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Burrowing owl – western (<i>Athene cumicularia hypugaea</i>)	not present	The project area lacks suitable habitat; no known occurrences within 10 miles. Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.

Species	Habitat Occurrence	Comments/Determination
Boreal owl (<i>Aegolius funereus</i>)	not present	Although 57 acres of spruce/fir may be treated as part of both action alternatives, the treatment areas lack the mature and old-growth spruce/fir forest component as preferred by this species (BISON-M 2017f). Boreal owls have been documented in New Mexico but are present in very low numbers, likely due to the quantity and isolated nature of spruce/fir habitat types (BISON-M 2017f). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Mammals (9)		
cinereus (masked) shrew (<i>Sorex cinereus cinereus</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
water shrew (<i>Sorex palustris navigator</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
spotted bat (<i>Euderma maculatum</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
pale Townsend's big-eared bat (<i>Corynorhinus townsendii pallescens</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
American pika (<i>Ochotona princeps saxatilis</i>)	not present	Treatment areas do not have talus slopes or boulder field habitat required by this species (BISON-M 2017g). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Gunnison's prairie dog (<i>Cynomys gunnisoni</i>)	not present	In New Mexico, this species occurs in colonies in mixed shrub or open, grassy habitats less than 6,700 feet in elevation (BISON-M 2017h). The project area lacks suitable habitat and known prairie dog occurrences. Therefore, alternative 1 and 2 would have <u>no effect</u> on this species.
American marten (<i>Martes americana origenes</i>)	not present	Although 57 acres of spruce/fir may be treated as part of both action alternatives, the treatment areas lack the preferred larger contiguous habitat of mature and old-growth spruce/fir forest with an understory containing established downed logs and stumps (BISON-M 2017i). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Fish (3)		
Rio Grande Sucker (<i>Castostomus plebeius</i>)	not present	No occurrence within or immediately downstream from the project area. Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Rio Grande Chub (<i>Gila pandora</i>)	not present	No occurrence within or immediately downstream from the project area. Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Rio Grande Cutthroat Trout (<i>Oncorhynchus clarki virginalis</i>)	not present	No occurrence within or immediately downstream from the project area. Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
Insects (1)		
nokomis fritillary (<i>Speyeria nokomis nokimis</i>)	present	Analysis required. Refer to the <i>Potential for Effects</i> section.

Species	Habitat Occurrence	Comments/Determination
Plants (5)		
yellow lady's slipper (<i>Cypripedium parviflorum</i> var. <i>pubescens</i>)	not present	The project area lacks the preferred habitat of wooded boggy areas and wetlands (NatureServe 2015h). In addition, this species has not been documented in Taos or Rio Arriba Counties (SEINet 2017). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
alpine larkspur (<i>Delphinium alpestre</i>)	not present	Treatment areas are below the alpine tundra or subalpine coniferous forest biotic zones (11,500 – 13,000 feet) required by this species (NMRPTC 1999). Therefore, alternatives 1 and 2 would have <u>no effect</u> on this species.
robust larkspur (<i>Delphinium robustum</i>)	potentially present	Analysis required. Refer to the Potential for Effects section.
Pecos (hairless) fleabane (<i>Erigeron subglaber</i>)	not present	Rocky, (generally greater than 50% exposed rock) open meadows in subalpine-montane conifer forest at 9,950 to 11,600 feet.
Arizona willow (<i>Salix arizonica</i>)	potentially present	Analysis required. Refer to the <i>Potential for Effects</i> section.

Potential for Effects

The following species require further analysis:

- Northern leopard frog
- Northern goshawk
- cinereus (masked shrew)
- Water shrew
- Spotted bat
- Pale Townsend's big-eared bat
- nokomis fritillary
- Robust larkspur
- Pecos (hairless) fleabane
- Arizona willow

Forest Service Sensitive Wildlife Species

Northern leopard frog

Species Description

Northern leopard frogs are generally associated with slow-moving, permanent or semi-permanent bodies of water (Smith and Keinath 2007 and references therein). However, this species is also dependent upon a multitude of habitats and habitat connectivity to meet the requirements for all life stages (Merrell and Rodell 1968; Smith and Keinath 2007). Breeding and tadpole habitat includes slow-moving, open-canopy habitat such as stock ponds, beaver ponds, lake margins, and stream backwaters (Corn and Livo 1989; USFWS 2011; BISON-M 2017j). Timing within the year for breeding is elevation-dependent, and varies from early April to early May (Corn and Livo 1989; Smith and Keinath 2007). Adults attach clusters of egg masses to underwater vegetation, which then hatch into completely aquatic tadpoles (USFWS 2011). It may take between three to six months from an egg to metamorphose into an adult frog (USFWS 2011). Post-breeding, adults move into wet, upland habitats for the summer months (Merrell 1970) and then

migrate to overwintering sites in autumn (Merrell 1970; Smith and Keinath 2007). In winter, it is suspected frogs utilize the bottoms of flowing streams, ponds, and springs that are not subject to freezing, as well as underground sites (Emery et al. 1972; Smith and Keinath 2007; NatureServe 2015a). Thus meadows, wetlands, and riparian areas are important connecting habitats for the life history of this species (Smith and Keinath 2007; USFWS 2011).

Adult and subadult frogs consume a variety of terrestrial invertebrates, such as insect adults and larvae, spiders, and leeches and adults have also been documented to consume other leopard frogs, birds, and snakes (USFWS 2011). Tadpoles are herbivorous and will consume a variety of aquatic vegetation and algae (USFWS 2011). Tadpoles become opportunistic carnivores as juveniles and insectivores as post-metamorphic adults (Smith and Keinath 2007).

Population declines for this species are contributed to habitat loss, disease (e.g. chytridiomycosis), invasive species competition, pesticide use, climate change, and depredation (Smith and Keinath 2007; USFWS 2011; NatureServe 2015a).

Affected Environment

Due to the wide variety of habitat needed for all life-stages of this species, miles of perennial streams, acres of riparian habitat (including a stream-side buffer), and acres of wetland habitat were used for suitable habitat considerations. The riparian areas identified for treatment within the project units do not necessarily overlap spatially with perennial waters but are considered because they may provide suitable habitat in the form of pooled water sources or connectivity to more suitable habitats. A 30 meter (98 foot) buffer was used to incorporate habitat adjacent to perennial streams and wetlands and was added into the suitable habitat analysis for this species. Not all of the miles and acres represented here would likely support this species due to a lack of connectivity or site-specific habitat features, such as aquatic vegetation or slow-moving pools. However, this analysis represents a broad-scale approach to potential habitat that this species may utilize within its life history.

There are 3.4 miles of perennial (year-round) streams within the project area boundary and 81 acres of riparian habitat within treatment areas and the project boundary. Perennial streams consist of Capulin Creek and the Rio Fernando. No mapped wetland areas occur within the treatment areas or the project area.

There are 9 springs within the treatment areas. The current condition and functionality of these springs is unknown. These springs may provide additional habitat for this species although suitable habitat in these areas may differ both within and across years, depending on water flow and availability. Due to the habitat variability, the number of acres of suitable habitat that a spring provides is not quantifiable, but effects to the potential habitat is disclosed in the *Environmental Consequences* section.

Total amount of suitable habitat for the Northern leopard frog within the treatment areas is 81 acres. The function of the riparian, stream, and wetland habitats listed above may be altered due to conifer encroachment, erosion, the presence of roads, or illegal vehicular traffic through these sensitive areas. Erosion and headcuts can channelize water flow. Channelized surface water flow prevents wetting of soils adjacent to streams and wetlands, which can decrease the presence of emergent vegetation that Northern leopard frogs prefer. In addition, channelized and straight streams lack slow-moving pools that this species may utilize for early life stages, such as egg-laying and tadpole development.

Potential treatments that could affect this species include: riparian treatments, prescribed fire, and spring developments. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 81 acres of suitable riparian or streamside habitat, 3.4 miles of suitable stream habitat, and up to 9 springs have the potential to be affected by mechanical vegetation treatments, prescribed fire, and spring developments. This represents about 2 percent of wetland and riparian areas present within the four HUC12 subwatersheds involving the project area.

Potential direct and immediate effects to this species and the habitat include: potential disturbance, relocation, or mortality due to machinery or prescribed fire and a reduction of some streamside or riparian vegetative cover due to tree removal, prescribed fire, or compaction from machinery. However, implementation of stream management zones and other BMPs would reduce or eliminate the direct effect of roads and proposed treatments to riparian-wetland areas and stream-riparian areas.

Although prescribed fire may have negative short-term effects to this species, it is likely fire within or adjacent to springs would encourage herbaceous vegetation growth around those sites. This would be beneficial to the Northern leopard frog as this could provide additional terrestrial cover utilized by this species.

It is likely a temporary decrease in prey availability due to increased sedimentation from spring development, conifer removal, or soil compaction from machinery outside stream areas may also indirectly affect this species. Increased sedimentation and turbidity during these activities could potentially reduce the invertebrate population. However, it is likely turbidity would subside a few hours after operation activities have ceased and the aquatic prey base would return to pre-implementation levels in the year following the riparian or streamside treatments.

Over the long-term, this species would benefit from the project activities. A reduction of encroaching conifers and re-establishment of riparian vegetation would likely encourage additional herbaceous aquatic vegetation which provides habitat for Northern leopard frogs and their prey base. These activities could also create small pools that could allow for egg mass deposition or provide tadpole habitat. In addition, increasing surface and subsurface water flow and wetting additional soils could protect leopard frog habitat against the effects of uncharacteristic wildfire.

Proposed range improvements include developments at 9 existing springs under Alternative 1 and 4 spring under Alternative 2. These developments would pipe a portion of water flow away from the spring site to a drinker available for livestock use. The springs would be fenced with wildlife-friendly fencing with spring water available at the site. While some removal of water for livestock use will occur, these improvements are expected to be a net benefit to spring habitats and associated wildlife, including northern leopard frog, because spring sites and spring-associated riparian habitat would be allowed to develop unaffected by livestock trampling.

Up to 10.5 miles (approximately 32 acres) of riparian restoration (conifer removal) within the project area and adjacent to the Rio Fernando in the La Sombra and Capulin Campgrounds are expected to improve riparian habitat by removing competing conifer, reducing the potential for stand replacement fire within riparian habitats.

Under alternative 1, no new system roads would be created. Reroute of existing system roads and temporary road construction of up to 5 miles, with one ephemeral stream crossing, would occur during

implementation to allow access to thinning units. This may cause short-term impacts due to increased sedimentation and turbidity, as a result of machinery and road traffic activities during implementation.

Up to 5 miles of new system road would be created under alternative 2. Reroute of existing system roads and temporary road construction of up to 5 miles and including 3 stream crossings would occur during implementation to allow access to thinning units. Construction of a new system road could potentially increase sedimentation and turbidity during the implementation phase and to a lesser degree in the longer term as the road would be closed post-treatment. Both temporary and new system roads would be designed to reduce the potential for erosion and sedimentation.

In summary, suitable habitat for the northern leopard frog would likely improve in quality over time due to the activities in both action alternatives. Project activities would potentially improve riparian areas and spring sites, and increase slow-moving pools. In addition, increasing riparian vegetation could reduce the severity of uncharacteristic wildfire to these habitats.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on northern leopard frog and its habitat. These activities include grazing, recreation development, road development, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, the Capulin, Fernandez, East Fernandez, and Tienditas allotments are active within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas including spring sites and riparian habitats have been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition and reduced the amount of riparian habitat available. Historical grazing would have had a negative effect on leopard frogs due to the loss of riparian vegetation and changes to riparian function, changes to timber stands structures, and removal of fuels for natural wildfires. Currently, grazing is actively managed and some site-specific prey habitat with herbaceous cover could still be negatively impacted. Past road development along Capulin Creek and Rio Fernando have altered available riparian vegetation and likely altered natural stream flow processes along these channels. Development of La Sombra and Capulin campgrounds along the Rio Fernando River has also affected availability of riparian habitat at these sites.

Existing road use, use of developed campgrounds, and livestock grazing would occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but the overlap of disturbance is likely short-term, lasting only during the period of project implementation. The combination of grazing, recreation, and other activities may have an incremental effect on northern leopard frogs by potentially altering riparian condition in the short-term, but subsequent development of riparian habitats at spring sites, riparian corridors, and developed campgrounds would benefit the species in the long term. Therefore, cumulative effects are considered insignificant.

Determination

Alternatives 1 and 2

Due to the limited temporary negative effects on habitat or individuals and the likelihood of improved habitat quality after implementation activities, alternatives 1 and 2 may effect individuals but is not likely to result in a trend toward listing or a loss of viability for the Northern leopard frog.

Northern goshawk

Species Description

In the southwest, Northern goshawks are forest generalists and use a variety of forest types for breeding and foraging (Reynolds et al. 1992); however, they are habitat specialists with respect to forest structure (Greenwald et al. 2005; Reynolds et al. 2006). These habitat components that make up a home range are described according to three different spatial scales: nest area (approximately 20-25 acres), post-fledging area (PFA; approximately 300-600 acres), and foraging area (approximately 5,000-6,000 acres) (Reynolds et al. 1992).

Northern goshawk nest site habitat selection varies in size, although goshawks prefer areas of high canopy closure, large tree size (VSS 5-6), great density of large trees, and abundant coarse woody debris (Greenwald et al. 2005; Reynolds et al. 2006). These selected characteristics for both nest sites are consistent with mature to old-growth forests. Many nest areas are also on slopes with northern exposures or in drainages or canyon bottoms (Reynolds et al. 1992). Northern goshawks occupy nesting areas from early March until September and often build multiple nests within an area prior to choosing one for breeding, which may be used in subsequent years (Reynolds et al. 1992).

Post-fledgling family areas (PFAs) surround nest areas and are used by adults and fledgling birds learning to hunt (Reynolds et al. 1992). PFAs generally contain a mosaic habitat patches with a variety of structural characteristics, including patches similar to nest areas (large, living trees, high canopy cover, etc.) along with openings and patches with younger and mid-aged trees with cover, as well as understories containing habitat critical to the life-histories of goshawk prey species (Reynolds et al. 1992).

Goshawk foraging habitat contains a variety of forested age classes and openings with ample snags, downed logs, woody debris, and herbaceous and shrubby understories where goshawks can search for prey species residing within these habitats (Reynolds et al. 1997; Reynolds et al. 2006). Within ponderosa pine forests, goshawks select foraging sites with high canopy closure, greater tree density, and greater density of large trees compared to unused areas (Beier and Drennan 1997), with some males moving toward piñon-juniper forests in the winter (Drennan and Beier 2003). Goshawks prey on small-to-medium birds and mammals such as American robins, mourning doves, red and tassel-eared squirrel, and rabbits (Reynolds et al. 1992; Squires and Reynolds 1997).

Threats to this species include mature tree harvest and uncharacteristic wildfires (NatureServe 2015b).

Affected Environment

There are no reported goshawk occurrences or northern goshawk nest sites within the project boundary. Surveys were conducted in the southern section (approximately 40% of the project area) in 2011 as part of the Tri-State, Hernandez to Black Lake Transmission Line Access Project. No goshawks were detected during those surveys. Due to more than five years elapsing prior to the last survey, additional surveys for Northern Goshawks will be conducted prior to implementation.

The Forest Plan in conjunction with the General Technical Report RM-217 (Reynolds et al. 1992) outlines appropriate forest structure variables to meet Northern goshawk habitat preferences. Landscapes outside of post-fledgling family areas within ponderosa pine and mixed conifer, and spruce/fir forests consists of 10 percent VSS 1, 10 percent VSS 2, 20 percent VSS 3, 20 percent VSS 4, 20 percent VSS 5, and 20 percent VSS 6 (**Table**). Differences shown between existing and desired VSS classes include deficits in early structural stages (VSS 1, 2), an overabundance of medium and large (VSS 4, 5) structure stands, and less than desired amounts of very large (VSS 6) structure.

Table 13. Existing and desired vegetation structural stage of ponderosa pine, mixed conifer, and spruce/fir forest types within the Pueblo Ridge Project Area

Vegetation Structural Stage (VSS)	Existing Condition within treatment areas	Desired Condition within treatment areas	Discrepancy Between Existing and Desired
VSS 1 (0-9"DBH)	2.1% - 137 acres	10% - 670 acres	-7%
VSS 2 (1-4.9" DBH)	0.6% - 40 acres	10% - 670 acres	-8.4%
VSS 3 (5-11.9" DBH)	25.9% - 1,736 acres	20% - 1,339 acres	+5.9%
VSS 4 (12-17.9" DBH)	42.0% - 2,814 acres	20% - 1,339 acres	+22.0%
VSS 5 (18-23.9" DBH)	18.2% - 1,215 acres	20% - 1,339 acres	-1.8%
VSS 6 (24+" DBH)	11.2% - 753 acres	20% - 1,339 acres	-8.8%

Nesting Habitat

Reynolds et al. (1992, table 5) describes structural attributes of goshawk nesting habitat by forest cover type. Those attribute values including trees/acre, mean diameter, basal area, and canopy cover were queried for this project to represent existing goshawk nesting habitat, which totals 1,045 acres and occurs primarily in mixed conifer and ponderosa pine stands located in the eastern portion of the project area (Figure 12).

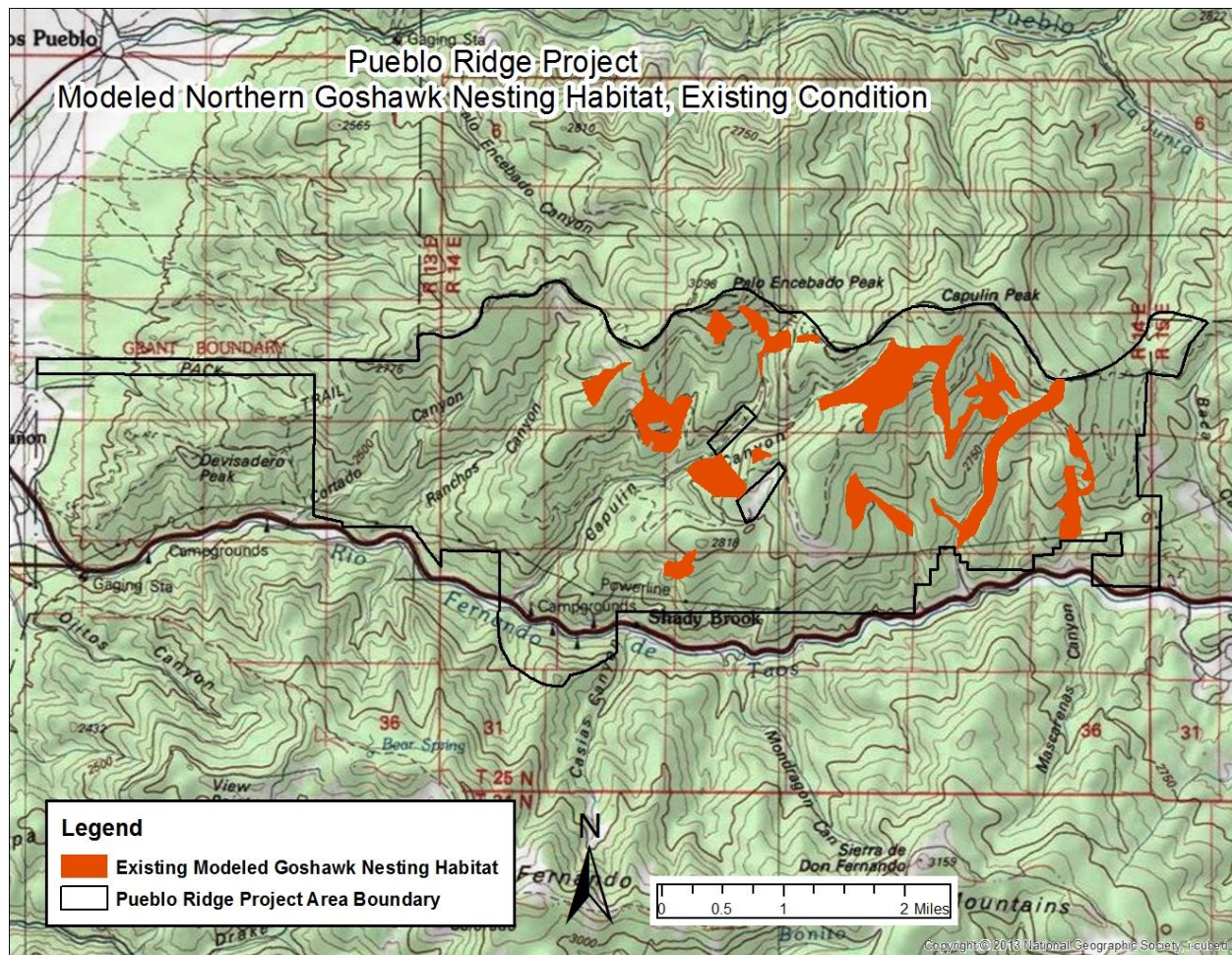


Figure 12. Northern goshawk modeled nesting habitat, existing condition

Foraging Habitat

Reynolds et al. (1992, table 7) describes prey species habitat requirements according to forest type, size, and density. Common prey species including American robin, blue grouse, woodpeckers, sapsuckers, and red squirrels utilize a wide variety of forest habitat types ranging from open early structure stands to dense stands with large trees, but goshawk foraging habitat consists primarily of forests with relatively open understories and large trees. These forests are in older age classes with moderate overstory cover (40-60%) and well-developed herbaceous and shrub layers. Stands contain small to medium openings (<4 acres) and patches of dense mid-aged forests with large tree components (live trees, snags, and downed logs) scattered throughout the foraging area. The large tree components often occur in clumps with interlocking crowns.

Existing forest size and density conditions within the project area (Figure 13) consist of relatively small amounts of early forest structure (VSS 1, and 2A) and open medium-mature forest (VSS 4A, 5A, 6A), moderate amounts of mature forest with moderate overstory cover (VSS 5B, 6C), and an abundance of medium-older aged stands with moderate to high overstory cover (VSS 4B, 4C, 5C).

Environmental Consequences

Alternative 1

Alternative 1 would incorporate the best available science for restoration in frequent-fire forests (Reynolds et al. 2013; Restoring Composition and Structure in Southwestern Frequent-Fire Forests, RMRS-GTR-310), including clarifying language for northern goshawk management. This guidance document provides a framework for managing dry, frequent-fire forests, and this framework integrates ecosystem restoration, fuels reduction and encourages more resiliency to undesired disturbance events such as high severity wildfires, and improving habitat for goshawks.

One of the key concepts in GTR-310 (Reynolds et al. 2013) is that moving from homogenous to more diverse habitat structures will support a more diverse vertebrate prey base for goshawks. Thus, by following GTR-310 (Reynolds et al. 2013), proposed treatments should provide benefits to a range of wildlife species. For instance, the basic design that will guide mechanical thinning treatments is to create small openings (interspaces) with a stronger herb-forb-grass component, while retaining patches, or clumps, of trees with interlocking canopies. The result will be a greater diversity of habitat structures within a given area (mid-scale). GTR-310 (Reynolds et al. 2013), while more focused on the silvicultural side of restoration, was developed following habitat guidelines presented in GTR-217, a USDA Forest Service technical report titled Management Recommendations for the Northern Goshawk in the Southwestern United States (Reynolds et al. 1992).

Noise from vehicular traffic and machinery from project activities (e.g. cutting and removing trees, improving system roads, or cutting and scattering slash) would temporarily displace both foraging Northern goshawks and prey items if present during implementation activities. Any present foraging goshawks or prey individuals would likely move out of the disturbed area into adjacent, undisturbed habitat. This disturbance would likely be short-term and localized in nature, consisting of phased tree removal and traffic over the summer months. It is expected prey individuals would also return once implementation activities have ceased and herbaceous ground cover recovers from potential compaction due to machinery.

Prescribed fire is expected to have similar effects to individuals by disturbing foraging Northern goshawks and prey items during implementation. Displaced goshawks can forage in adjacent, undisturbed habitat. Both goshawks and prey are expected to return after the area re-vegetates following a prescribed burn.

No new system roads would be created under this alternative. Reroute of existing system roads and temporary road construction of up to 5 miles would occur during implementation to allow access to thinning units. Use of temporary roads could increase disturbance during project implementation if goshawks are nearby during the nesting season. However, the risk is low because suitable habitats would be surveyed for goshawk nesting presence prior to implementation and areas around goshawk nest sites would be restricted by a limited operating period. The temporary roads would be decommissioned once the project is completed. Decommissioning of up to 13 miles of closed roads would limit illegal trespass via motorized means and provide an indirect benefit by reducing potential disturbance.

Existing modeled goshawk nesting habitat within the project area totals about 1,045 acres. Proposed treatments under Alternative 1 would reduce basal area and canopy cover values to below those prescribed as meeting nesting requirements (Reynolds et al. 1992) on approximately 793 acres (76%) of existing nest stands, thereby potentially limiting goshawk nesting opportunities within the project area.

Stand density reductions within proposed fuel break units are expected to benefit goshawk habitat overall by reducing the potential for stand replacement fire both inside and outside the project area.

Nesting goshawks currently utilizing the project area should not be negatively affected as treatment areas will be surveyed prior to implementation and management guidelines shall be followed to avoid any negative effects to breeding or breeding habitat.

Existing forest size and density conditions within the project area consist of relatively small amounts of early forest structure and open medium-mature forest, moderate amounts of mature forest with moderate overstory cover, and an abundance of medium-older aged stands with moderate to high overstory cover. Under Alternative 1, vegetation and fuels treatments would increase available early structure as well as open canopy moderate-aged and mature forest stands while reducing amounts of dense moderate-aged and mature forest structure for all forest types considered (Table 14). Mature stands with 40-60% canopy cover described as optimal goshawk foraging habitat (VSS 5B and 6B) by Reynolds et al. (1992) would be reduced only slightly overall. Proposed treatments are expected to maintain adequate amounts of habitat to maintain most prey species and result in increases of prey associated with open mature stands such as cottontails and golden-mantled ground squirrels, but reductions in dense moderate-aged and mature habitats (4C, 5C, and 6C) may limit red squirrel availability as a prey source. While treatments would reduce existing goshawk nesting habitat, post-treatment conditions under alternatives 1 and 2, both alternatives would reduce risk of stand replacement fire and resulting habitat loss in comparison to the existing condition (see Fuels Specialist Report).

Table 14. Goshawk habitat structure amounts, existing condition and post-treatment, Alternative 1

VSS Class	Existing Condition	Alternative 1 Post-treatment	Change
1	138	259	+121
2	40	0	-40
3A	133	286	+153
3B	942	173	-769
3C	661	45	-616
4A	0	2,033	+2,033
4B	1,547	1,183	-364
4C	1,241	87	-1,154
5A	104	754	+650
5B	658	781	+123
5C	454	300	-154
6A	116	703	+587
6B	516	294	-222
6C	96	64	-32

Alternative 2

Direct and Indirect Effects

Goshawks may utilize habitat for nesting, as a post-fledging family area, or as foraging habitat. Although these areas generally depart from the preferred habitat structure, goshawks may still utilize areas containing less than ideal strands due to limited availability of preferred habitat. Nesting goshawks

currently utilizing the project area would not be negatively affected as treatment areas will be surveyed prior to implementation and management guidelines shall be followed to avoid any negative effects to individuals and associated nesting habitat.

Noise from vehicular traffic and machinery from project activities (e.g. cutting and removing trees, improving system roads, or cutting and scattering slash) may temporarily displace both foraging Northern goshawks and prey items during implementation activities. Any present foraging goshawks or prey individuals would likely move out of the disturbed area into adjacent, undisturbed habitat. This disturbance would likely be short-term and localized in nature, consisting of phased tree removal and traffic over the summer months. It is expected prey individuals would also return once implementation activities have ceased and herbaceous ground cover recovers from potential compaction due to machinery.

Prescribed fire is expected to have similar effects to individuals by disturbing foraging Northern goshawks and prey items during implementation. Displaced goshawks can forage in adjacent, undisturbed habitat. Both goshawks and prey are expected to return after the area re-vegetates following a prescribed burn.

In general, forested stands within the project area would be managed to maintain quality habitat as specified in the Forest Plan. Vegetative prescriptions would manage for uneven-age forest stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels throughout woodland, ponderosa pine, mixed-conifer, and spruce/fir forest cover types. In addition, silviculture prescriptions would manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available. In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape, and increased understory vegetation, which are all beneficial to Northern goshawks and prey species. Therefore, over the long-term, suitable habitat for this species would likely increase in quality and have increased resilience to stand-replacing crown fire and insect and disease infestation. Overall forest health would likely improve.

Existing forest size and density conditions within the project area consist of relatively small amounts of early forest structure and open medium-mature forest, moderate amounts of mature forest with moderate overstory cover, and an abundance of medium-older aged stands with moderate to high overstory cover. Under Alternative 1, vegetation and fuels treatments would increase available early structure as well as open canopy moderate-aged and mature forest stands while reducing amounts of dense moderate-aged and mature forest structure for all forest types considered (Table 15). Mature stands with 40-60% canopy cover described as optimal goshawk foraging habitat (VSS 5B and 6B) by Reynolds et al. (1992) would be reduced only slightly overall. Proposed treatments are expected to maintain adequate amounts of habitat to maintain most prey species and result in increases of prey associated with open mature stands such as cottontails and golden-mantled ground squirrels, but reductions in dense moderate-aged and mature habitats (4C, 5C, and 6C) may limit red squirrel availability as a prey source. Treatments are likely to benefit both goshawk and prey species overall by reducing the risk of overstory canopy loss due to stand replacement fire.

Table 15. Goshawk habitat structure amounts, existing condition and post-treatment, Alternative 2

VSS Class	Existing Condition	Alternative 2 Post-treatment	Change
1	138	112	+57

2	40	0	-33
3A	133	205	+2
3B	942	451	-593
3C	661	0	-460
4A	0	1,019	+1,009
4B	1,547	1,936	+489
4C	1,241	335	-1,040
5A	104	822	+775
5B	658	799	+114
5C	454	322	-146
6A	116	625	+506
6B	516	248	-265
6C	96	64	-32

Proposed treatments under Alternative 2 would reduce basal area and canopy cover values to below those prescribed as meeting nesting requirements (Reynolds et al. 1992) on approximately 779 acres (75%) of existing nest stands, thereby potentially limiting goshawk nesting opportunities within the project area. Stand density reductions within proposed fuel break units are expected to benefit goshawk habitat overall by reducing the potential for stand replacement fire both inside and outside the project area.

Nesting goshawks currently utilizing the project area should not be negatively affected as treatment areas will be surveyed prior to implementation and management guidelines shall be followed to avoid any negative effects to breeding or breeding habitat.

Up to 5 miles of new system road would be created under this alternative; however, potential disturbance would be short-term as this road would be closed post-treatment. Reroute of existing system roads and temporary road construction of up to 5 miles would occur during implementation to allow access to thinning units. Use of temporary roads could also increase disturbance during project implementation if goshawks are nearby during the nesting season. However, the risk is low because suitable habitats would be surveyed for goshawks prior to implementation and areas around nest sites would be restricted by a limited operating period. The temporary roads would be decommissioned once the project is completed. Decommissioning of up to 13 miles of closed roads would limit illegal trespass via motorized means and provide an indirect benefit by reducing potential disturbance.

Other proposed activities under alternative 2 including restoration treatments, road management, and range improvements, are expected to have minimal impacts on existing Northern goshawk. If goshawks are determined present within the project area, project design criteria would apply to minimize risk of disturbance and impacts to habitat.

In summary, habitat for the Northern goshawk would likely improve in quality due to the activities in Alternative 2. Project activities would encourage development of uneven-aged and multistoried stands by increasing tree growth and vigor, improve habitat for prey, and would reduce susceptibility to pathogens and stand-replacing wildfire.

Cumulative effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on northern goshawk and its habitat. As a species with specific nesting and roosting requirements but more flexible foraging habitat, areas outside of protected and restricted habitat were considered. These activities include grazing, recreation, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, the Capulin, Fernandez, East Fernandez, and Tienditas allotments are active within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition and reduced the amount of riparian habitat available. Historical grazing would had a negative effect on goshawks due to the loss of prey species, changes to timber stands structures and removal of fuels for natural wildfires. Currently, grazing is actively managed and some site-specific riparian areas or prey habitat with herbaceous cover could still be negatively impacted. Additional sunlight from tree removal and prescribed fire would encourage the growth of ground cover which is often used as forage for cattle and as forage and cover for prey species. In addition, ground cover may be disturbed within the treatment areas during implementation activities due to machinery which may cause an additional disturbance to habitat utilized by prey species. The lack of suitable ground cover height may cause a temporary displacement of prey individuals, but these individuals would likely move to adjacent, undisturbed habitats and would return once the area is rested from grazing and vegetation recovers from project activities.

It is reasonable to assume recreational activities (such as camping, hiking, horseback riding, and hunting, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance is likely short-term because project and recreation activities would not occur without interruption for extended periods of time. If goshawk or prey individuals are present, they would likely relocate to adjacent, undisturbed habitat and would return when recreation and project activities cease.

Timber stands adjacent to treatment areas containing suitable goshawk habitat have been altered by previous and current timber, fuelwood, and prescribed fire projects. These projects are listed in Table 8. District-wide dead and down permits and latilla permits may also change stand composition and the amount of downed logs that contributes to goshawk and prey species habitat. These combined activities likely opened the canopy and increased grass and shrub availability to owl prey species. The improved stand condition and forest health resulting from these treatments likely has a cumulative benefit to the owl, unless excessive downed wood is harvested or many large, mature trees are poached within designated fuelwood units. In addition, these treatments contribute to an overall improved resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy habitat for this species.

The combination of grazing, recreation, and other activities may have an incremental effect on northern goshawks by potentially displacing foraging individuals or prey species and reducing potential habitat for prey. However, goshawk ability to conduct life-history behaviors would not be adversely impacted at the analysis area scale, so cumulative effects are considered minimal.

Determination

Alternatives 1 and 2

Due to the limited temporary negative effects on habitat or individuals and the likelihood of improved habitat quality after implementation activities, alternatives 1 and 2 may effect individuals but is not likely to result in a trend toward listing or a loss of viability for the Northern goshawk.

Cinereus (masked) shrew and water shrew

Due to the similar habitat types utilized by both the cinereus shrew and the water shrew, both species are analyzed together.

Species Description

In New Mexico, cinereus shrews are primarily found in the northern mountain ranges (Patterson 1980; BISON-M 2017l) and have been documented in mixed-conifer and spruce-fir montane forests and associated meadows and grasslands (Lomolino et al. 1989; Frey and Yates 1996). Cinereus shrews are generally associated with wet meadows and marshy areas (Spencer and Pettus 1966) and streamside woodland and brush, mountain meadows, and plains wetlands (Armstrong et al. 1973). They will burrow in leaf litter or soil and will also utilize fallen or hollow logs as habitat (NatureServe 2015d). This species breeds from March – September and may have up to three litters in one year (NatureServe 2015d). Cinereus shrews primarily feed on insects but they will also consume carrion, small vertebrates, and the occasional seed (NatureServe 2015d). Threats to this species include climate change as it prefers wet areas in upper elevations that may be altered due to rising temperatures (BISON-M 2017l).

Water shrews are strongly associated with riparian habitats in the vicinity of permanent streams (Conway 1952; Frey and Yates 1996; BISON M 2017m). This species typically utilizes areas with abundant cover, such as rocks, logs, or overhanging streambank vegetation (Conway 1952, NatureServe 2015e) and will create burrows within this habitat. They breed from January to July (Conway 1952) and can have more than one litter per year (BISON M 2017m). Water shrews primarily feed on both terrestrial and aquatic insects, although they will also consume small vertebrates, such as fish and amphibians (Conway 1952; NatureServe 2015e). Threats to this species include habitat loss due to logging, road building, agriculture, or livestock overgrazing, degradation of water quality, and climate change (BISON M 2017m).

Affected Environment

Due to the upper-elevation wetter habitat preference for both the cinereus shrew and the water shrew, acres of riparian habitat (including areas adjacent to streams) above 8,000 feet in elevation were used for suitable habitat considerations. This included streams within ponderosa pine, mixed-conifer, and spruce-fir forest types. A 30 meter (98 foot) buffer was used to incorporate habitat adjacent to perennial streams and was added into the suitable habitat analysis for these species due to their affinity to streamside areas. Not all of the miles and acres represented here would likely support these species due to a lack of site-specific habitat features, such as adequate leaf litter for burrowing or dense, herbivorous streamside vegetation for cover. However, this analysis represents a broad-scale approach to potential habitat that these species may utilize.

Within the project area, there is approximately 81 acres of riparian habitat. No mapped wetlands occur. There are approximately 3.4 miles of perennial (year-round) streams within the project area.

There are 9 springs within the treatment areas: The current condition and functionality of these springs is unknown. These springs may provide additional habitat for this species although suitable habitat in these

areas may differ both within and across years, depending on water flow and availability. Due to the habitat variability, the number of acres of suitable habitat that a spring provides is not quantifiable, but effects to the potential habitat is disclosed in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 81 acres of suitable riparian or streamside habitat have the potential to be affected by mechanical vegetation treatments, prescribed fire, re-establishment of native and natural riparian vegetation, and stream bank stabilization and channel reduction activities. This equates to about 2 percent of wetland and riparian areas present with the four subwatersheds that encompass the project area.

Potential direct and immediate effects to these species and the habitat include: potential disturbance, relocation, or mortality due to machinery noise or compaction or prescribed fire and a reduction of some streamside or riparian vegetative cover due to tree removal, prescribed fire, or compaction from machinery. However, implementation of stream management zones and other BMPs would reduce or eliminate the direct effect of roads and proposed treatments to riparian-wetland areas and stream-riparian areas.

Prescribed fire may remove leaf litter that the cinereus shrew utilizes for burrows or reduce abundant cover as required by the water shrew; however, it is also likely prescribed fire may create some snags or hollowed logs also used as habitat. Although prescribed fire may have negative short-term effects to this species, it is likely fire within or adjacent to wetland areas would encourage herbaceous vegetation growth around those sites. This would be beneficial to both shrew species as this could provide additional terrestrial cover in the year following the prescribed burn.

Soil compaction may occur due to machinery which may prevent shrews from creating burrows. This is especially likely in areas where road maintenance activities are occurring and temporary roads are utilized to access project areas. However, soil-compaction activities including skid trails and landings would be avoided in riparian areas. Shrews disrupted by project activities can relocate to adjacent, undisturbed areas outside of the treatment areas.

Over the long-term, these species would likely benefit from the project activities. Re-establishment of riparian vegetation would likely encourage additional herbaceous streamside vegetation which provides habitat for these species.

Proposed range improvements include developments at 9 existing springs under Alternative 1 and 4 springs under Alternative 2. These developments would pipe a portion of water flow away from the spring site to a drinker available for livestock use. The springs would be fenced with wildlife-friendly fencing with spring water available at the site. Although some reduction in available water would occur, these improvements are expected to benefit spring habitats and associated wildlife, including cinereus and water shrews, because spring sites and spring-associated riparian habitat would be allowed to develop unaffected by livestock trampling.

Up to 10.5 miles (approximately 32 acres) of riparian restoration (conifer removal) within the project area and adjacent to the Rio Fernando in the La Sombra and Capulin Campgrounds are expected to improve riparian habitat by removing competing conifer, reducing the potential for stand replacement fire within riparian habitats.

Under alternative 1, no new system roads would be created. Reroute of existing system roads and temporary road construction of up to 5 miles, with one ephemeral stream crossing, would occur during implementation to allow access to thinning units. This may cause short-term impacts due to increased sedimentation and turbidity, as a result of machinery and road traffic activities during implementation.

Up to 5 miles of new system road would be created under alternative 2. Reroute of existing system roads and temporary road construction of up to 5 miles and including 3 stream crossings would occur during implementation to allow access to thinning units. Use of a new system road could potentially increase sedimentation and turbidity during the implementation phase and to a lesser degree in the longer term because the road would closed post-treatment. Both temporary and new system roads would be designed to reduce the potential for erosion and sedimentation.

In summary, suitable habitat for the cinereus shrew and water shrew would likely improve in quality over time due to the activities in both action alternatives. Project activities would potentially improve suitable habitat by encouraging additional streamside vegetative growth. In addition, increasing wet soils and the amount of wetland and riparian vegetation could reduce the severity of uncharacteristic wildfire to these habitats.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on northern leopard frog and its habitat. These activities include grazing, recreation development, road development, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, the Capulin, Fernandez, East Fernandez, and Tienditas allotments are active within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas including spring sites and riparian habitats have been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition and reduced the amount of riparian habitat available. Historical grazing would had a negative effect on the cinereus and water shrews due to direct loss from trampling, streamside and wetland vegetation loss from foraging, increased erosion from hoof shear within sensitive areas such as springs and wetlands, and soil compaction in wetter soils likely used for burrowing. Currently, grazing is actively managed and some site-specific riparian areas with herbaceous and shrubby cover could still be negatively impacted. Additional sunlight from tree removal and prescribed fire would encourage the growth of upland ground cover which is often used as forage for cattle. This may help relocate cattle from sensitive areas into more upland areas, which could potentially maintain adjacent riparian and streamside vegetation that is utilized as habitat for the cinereus and water shrews. In addition, ground cover may be disturbed within the treatment areas during implementation activities due to machinery which may cause an additional disturbance to habitat utilized by this species. The lack of cover coupled with soil compaction may cause a displacement for this species, but these individuals would likely move to adjacent, undisturbed habitats and would return once area recovers from project activities.

Recreational activities (such as off-road vehicle use, camping, hiking, horseback riding, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance would likely be short-term since project and recreational activities would be intermittent and seasonal. However, there may be an additive effect of soil compaction with recreationists, their vehicles or horses, cattle, and project machinery. These effects may increase soil compaction within areas frequently used for all of the activities, such as stream crossings. This would likely reduce the available

burrowing habitat for the cinereus and water shrews within site-specific locations. It is likely these shrews would relocate to adjacent, undisturbed habitat that provides the ground or soil layers needed for burrowing. Due to implementation of BMPs in riparian areas under both action alternatives, cumulative impacts resulting from other ongoing and foreseeable activities are expected to be insignificant.

Determination

Alternatives 1 and 2

Due to the limited temporary negative effects on habitat or individuals and the likelihood of improved habitat quality after implementation activities, alternatives 1 and 2 may effect individuals but is not likely to result in a trend toward listing or a loss of viability for the cinereus shrew and water shrew.

Spotted bat and pale Townsend's big-eared bat

Due to the similar habitat types utilized by both the spotted bat and pale Townsend's big-eared bat, both species are analyzed together.

Species Description

Spotted bats roost in caves, on cliffs, within rocky crevices, and in human-made structures such as buildings in a wide variety of habitats from desert shrub to coniferous forests (Luce and Keinath 2007). Reproduction in this species is not well researched, although it is thought they breed from late February to April and give birth from late May to early July (Luce and Keinath 2007; BISON-M 2017f). Spotted bats forage on flying moths at night and will conduct long, fast, and high foraging flights through open meadows and near or above trees (Luce and Keinath 2007). Foraging habitat consists of openings found in a variety of habitats from desert shrub, agricultural fields, pinyon juniper, cliff rims, riparian corridors along rivers, to subalpine mountain meadows (Luce and Keinath 2007). Rather than a specific habitat type, structure is the key attribute, with a need for uncluttered foraging zones within insect-producing habitats where spotted bats can hunt by making long, fast flights (Storz 1995; Luce and Keinath 2007). Spotted bats also need open water sources for drinking, such as ponds, lakes, and/or rivers (Luce and Keinath 2007). Threats to this species are local and include foraging habitat alteration by grazing or water diversions and loss or disturbance of roost habitat (Luce and Keinath 2007; NatureServe 2015f).

Townsend's big-eared bat is similar to the spotted bat in that it requires caves or cave analogs (e.g. human-made structures such as buildings or mines) for roosting habitat (Gruver and Keinath 2006). This species will roost across a wide variety of habitat types at a range of elevations (Gruver and Keinath 2006). Townsend big-eared bats breed in fall but females delay the normal progression of the reproductive cycle during hibernation. They give birth to a single offspring in June (Gruver and Keinath 2006; BISON-M 2017o). Foraging habitat occurs across a wide variety of cover types (e.g., sagebrush and pinyon-juniper to montane and subalpine forest) and woodlands, canopy gaps, and vegetated stream corridors are all utilized for hunting moths at night (Gruver and Keinath 2006). Unlike the spotted bat, Townsend's big-eared bat is a slow, maneuverable flyer with the ability to hover which allows them to forage primarily in and near vegetation and along forest edges (Gruver and Keinath 2006). They avoid foraging and traveling in open areas and grazed lands (Gruver and Keinath 2006). Townsend's big-eared bats also need landscape features for drinking, such as small ponds or water impoundments (Gruver and Keinath 2006). Threats to this species include loss or disturbance of roosting habitat and exposure to environmental toxins (Gruver and Keinath 2006; BISON-M 2017o).

Affected Environment

There are no caves, mines, or cave analogs that either spotted bats or pale Townsend's big-eared bats would utilize for roosting within the project area. However, due to the varied habitat utilized for foraging for both of these species, all acres across all habitat types within the project area is considered suitable foraging habitat.

Wetland habitats are important for both of these species as a source of drinking water and for abundant sources of insect prey. No mapped wetlands occur within the project area.

Potential treatments that could affect this species include: manual and mechanical vegetation treatments in all habitat types, prescribed fire, and spring developments. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Suitable spotted bat and pale Townsend's big-eared bat foraging habitat within the project boundary could potentially be affected by project activities. Both foraging bats and prey individuals could utilize this habitat.

Since implementation activities would occur during the day, noise from machinery and human presence should not affect foraging bat species as they would be active between dusk and dawn. However, vegetative treatments would likely benefit these species of bats both in the short-term and the long-term.

Vegetative prescriptions would manage for uneven-age forest stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels throughout woodland, ponderosa pine, mixed-conifer, and spruce-fir forest cover types. In addition, silviculture prescriptions would manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. In the short term, thinning activities would likely increase interspace openings and uncluttered foraging zones as preferred by the spotted bat. Pale Townsend's big-eared bat would likely benefit from the increase of forested edge that would likely be created by vegetative activities. Over the long-term, prescriptions would favor a patchy mosaic of structure that would likely improve foraging habitat for both bat species. Re-establishment of riparian vegetation within riparian areas would likely encourage additional habitat for moths and other insects.

Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available. Prescribed fire would likely decrease prey availability in the short-term, but insects are expected to return after herbaceous vegetation has recovered which would likely occur in the year following prescribed fire. In the long-term, prescribed fire would assist with encouraging the patchy mosaic habitat structure that would improve foraging habitat for both bat species.

Road treatments under both alternatives are not expected to negatively affect bat foraging.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the spotted bat and the pale Townsend's big-eared bat and their foraging habitat. These activities include grazing and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, there are four active grazing allotments within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition in wetter areas. It is likely this historical grazing had a negative effect on spotted and Townsend's big-eared bats. Overgrazing may have contributed to a decrease in wetland function because of increased erosion from hoof shear. Currently, grazing is actively managed and some site-specific areas with sensitive soils could be negatively impacted. However, the beneficial improvements to riparian and streamside vegetation and repairs to existing erosion problems would likely offset any localized effects due to erosion caused by cattle. Thus grazing would not likely contribute to any significant additive effects across the landscape, but may contribute to some site-specific reduction in prey species due to localized erosion and the associated hydrologic alterations.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects listed in Table 8. These combined activities likely benefited these species by opening the canopy, improving interspace openings, increasing the amount of forested edge, and favoring a mosaic of age distributions.

Determination

Alternatives 1 and 2

Due to the limited temporary negative effects on foraging individuals and the likelihood of improved habitat structure for foraging and habitat quality for prey after implementation activities, alternatives 1 and 2 may effect individuals but is not likely to result in a trend toward listing or a loss of viability for the spotted bat and pale Townsend's big-eared bat.

Nokomis fritillary

Species Description

Habitat for the Nokomis fritillary butterfly consists of wetlands associated with flowing water, such as springs, seeps, and wet meadows, an abundance of larval food plant (e.g. bog violet – *Viola nephrophylla*) and composite flowers for an adult nectar source (Selby 2007). In the southwest, these conditions are sporadically met so butterfly populations are generally small and isolated (Selby 2007). Nokomis fritillary butterflies do not migrate but will move between isolated colonies within a continuous riparian area. For a population to persist, the entire life cycle must be completed within a given riparian system (Selby 2007). Eggs are laid singly and randomly near larval host plants in late summer to fall (Selby 2007). Larva hatch 17-18 days after eggs are laid and almost immediately enter diapause (delayed development) to survive the winter months (Selby 2007). Larva continue development in spring when bog violet leaves emerge (Selby 2007) and adults emerge as butterflies in July or August, depending on the sex (Scott and Mattoon 1981). Threats to this species include habitat loss and changes to hydrology, herbicidal reduction of plant food sources, and heavy grazing (Selby 2007; NatureServe 2015g).

Affected Environment

Due to the restricted wetland, stream-side, and riparian habitat needed for natural history and population connectivity for this species, acres of riparian habitat (including areas adjacent to streams) were used for suitable habitat considerations. No wetlands occur within the project area. A 30 meter (98 foot) buffer was used to incorporate habitat adjacent to perennial streams and was added into the suitable habitat analysis for these species due to their affinity wetter areas. This analysis area is largely contiguous along existing

perennial streams within the project area. The riparian areas identified for treatment within the project units do not necessarily overlap spatially with perennial waters but are considered because they may provide suitable habitat. Not all of the acres represented here would likely support the Nokomis fritillary because the bog violet or other composite plants may not exist at the sites. However, this analysis represents a broad-scale approach to potential habitat that these species may utilize.

There are 81 acres of riparian habitat surrounding approximately 3.4 miles of perennial (year-round) streams within the treatment areas and the project boundary. The project area contains no mapped wetland areas.

There are 9 springs within the treatment areas: The current condition and functionality of these springs is unknown. These springs may provide additional habitat for this species although suitable habitat in these areas may differ both within and across years, depending on water flow and availability. Due to the habitat variability, the number of acres of suitable habitat that a spring provides is not quantifiable, but effects to the potential habitat is disclosed in the *Environmental Consequences* section.

The function of the riparian habitats listed above may be altered due to conifer encroachment, erosion, the presence of roads, or illegal vehicular traffic through these sensitive areas. Erosion and headcuts can channelize water flow. Channelized surface water flow prevents wetting of soils adjacent to streams and wetlands, which can decrease the presence of bog violets and other composites that Nokomis fritillary prefers.

Potential treatments that could affect this species include: riparian treatments, prescribed fire, and spring developments. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 81 acres of suitable riparian or streamside habitat have the potential to be affected by mechanical vegetation treatments, prescribed fire, re-establishment of native riparian vegetation, and spring development activities. Temporary roads proposed under both action alternatives may impact suitable habitat locally. The 5 miles of new system road proposed under alternative 2 would include 3 stream crossings that may also reduce available habitat.

Potential direct and immediate effects to these species and the habitat include potential disturbance or mortality of individuals in all life stages and a reduction of some food sources due to compaction from machinery or prescribed fire. However, implementation of stream management zones and other BMPs would reduce or eliminate the direct effect of roads and proposed treatments to riparian-wetland areas and stream-riparian areas. Soil-compaction activities including skid trails and landings would also be avoided in riparian areas where the Nokomis fritillary is most likely to occur.

Although prescribed fire may have negative short-term effects to this species, it is likely fire within or adjacent to riparian areas would encourage herbaceous and composite vegetation around those sites. This would be beneficial to the Nokomis fritillary as the composite food source could potentially increase in the year following a prescribed burn. In addition, prescribed fire would be introduced as phases within the treatment areas, so not all populations of this species (if present) would be impacted simultaneously.

Proposed range improvements include developments at 9 existing springs under Alternative 1 and 5 springs under Alternative 2. These developments would pipe a portion of water flow away from the spring site to a drinker available for livestock use. The springs would be fenced with wildlife-friendly fencing with spring water available at the site. While some reduction in available water may occur resulting in reduced suitable habitat for bog violet growth, these improvements are expected to benefit spring habitats and associated wildlife, including Nokomis fritillary, because spring sites and spring-associated riparian habitat would be allowed to develop unaffected by livestock trampling.

Up to 10.5 miles (approximately 32 acres) of riparian restoration (conifer removal) within the project area and adjacent to the Rio Fernando in the La Sombra and Capulin Campgrounds are expected to improve riparian habitat by removing competing conifer, reducing the potential for stand replacement fire within riparian habitats.

With the exception stream locations crossed by the 5 miles of new system road (Alternative 2 only), over the long-term, the Nokomis fritillary would likely benefit from the project activities. Re-establishment of riparian vegetation could increase water availability in some areas and would likely encourage additional herbaceous streamside vegetation which could be utilized as a food source for this species.

In summary, suitable habitat for the Nokomis fritillary would likely improve in quality over time due to the activities proposed under the action alternatives. Project activities would potentially improve riparian areas due to reduced erosion and increased response of riparian vegetation. In addition, increased amounts of riparian vegetation could reduce the severity of uncharacteristic wildfire to these habitats.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the Nokomis fritillary. These activities include grazing, recreation, and historic timber management and prescribed fire projects adjacent to streamside and wetland areas.

The project boundary has historically been grazed for several hundred years. Currently, there are four active grazing allotments within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition in riparian areas. It is likely this historical grazing had a negative effect on the Nokomis fritillary. Overgrazing may have contributed to a decrease in wetland and stream function because of increased erosion and soil compaction from hoof shear and widening of areas utilized for drinking and frequent crossing, which likely inhibited plant growth used as a food source for this species. Currently, grazing is actively managed and some site-specific areas with sensitive soils could be negatively impacted. However, the improvements to riparian and streamside vegetation and repairs to existing erosion and sediment problems would likely offset any localized effects due to erosion caused by cattle. In addition, light to moderate grazing would actually promote growth of bog violets, which is the primary food source for the larva stage of this species (Selby 2007). Thus grazing would not likely contribute to any significant additive effects across the landscape, but may contribute to some site-specific reduction or increases in plants used as a food source.

It is reasonable to assume recreational activities (such as off-road vehicle use, camping, hiking, horseback riding, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance would likely be short-term since project and recreational activities would be intermittent and seasonal. Camping along streams may have an additive negative effect on this species. The use of tents or

other equipment and frequent soil compaction around popular camping sites could reduce plant growth that this species utilizes for forage. This activity in conjunction with the project activities and active grazing could reduce food availability and habitat connectivity for this species at localized sites.

Historic timber management and prescribed fire projects have occurred across the landscape, and may have had both positive and negative impacts that include reduced potential for stand replacement fire and negative impacts to riparian vegetation. Since other areas within the watershed have been thinned and burned, they are less likely to support stand-replacing wildfire. Treating riparian areas in combination with the existing treatments would decrease the likelihood of uncharacteristic wildfire and could potentially preserve populations of the Nokomis fritillary.

Determination

Alternatives 1 and 2

Due to limited spatial and temporal effects to the butterfly and a benefit to riparian habitat over time, alternatives 1 and 2 may effect individuals but is not likely to result in a trend toward listing or a loss of viability for the Nokomis fritillary.

Forest Service Sensitive Plant Species

Robust larkspur and Arizona willow

Due to the similar habitat requirements and life history, effects to these two plants were analyzed together.

Species Description

The robust larkspur is a perennial forb that occurs in valley bottoms, riparian woodlands, subalpine meadows, and aspen groves within lower and upper montane coniferous forests such as spruce/fir, mixed conifer, and ponderosa pine (Beatty et al. 2004). Although habitat characteristics have not been extensively described, this species generally occurs from elevations from 7,000-11,200 feet and has been documented in wetter areas of dense forest, open woods, woodland edges, meadows and meadow edges, and roadsides (Beatty et al. 2004). This species has been documented in Rio Arriba and Taos Counties (NMRPTC 1999). Threats to this species include: trampling from motorized and non-motorized recreation and cattle, trail or road construction and maintenance, erosion and sedimentation, grazing, non-native species invasion, and changes to natural disturbance regimes such as fire suppression (Beatty et al. 2004).

The Arizona willow is a perennial, deciduous shrub associated with high elevation wet meadows and alongside areas with perennial water including streams, seeps, and springs (Decker 2006). In New Mexico, this species has been documented to occur between 9,560-11,680 feet (Decker 2006) and has been documented in Rio Arriba and Taos Counties (NMRPTC 1999; SEINet 2017). Threats to this species include grazing by domestic and wild ungulates, hydrologic alterations, timber harvest and associated activities (such as road and trail building), and recreational activities (Decker 2006).

Affected Environment

Due to the potential elevation range these two plant species, habitats between 7,000 (robust larkspur minimum elevation) to 11,680 feet (maximum elevation for Arizona willow) were considered for this analysis. This includes habitat within the ponderosa pine, mixed conifer, and spruce/fir forest types as

well as riparian areas. Exact locations of these species are not known, so a combination of forest cover types, elevation, and preferred habitat descriptions is utilized to determine the affected acres for these species.

Since actual locations of populations of these species is unknown, the suitable riparian habitats throughout the project area are considered as potential habitat for the robust larkspur which has the greatest elevation range of all three species. The Arizona willow has potential to occur in similar habitats above 9,500 feet, with an emphasis on areas surrounding perennial water. No mapped wetlands occur within the project area boundary.

There are 9 springs within the treatment areas: These springs and adjacent areas may provide additional habitat for all three species (although it would vary based on elevation) although suitable habitat in these areas may differ both within and across years, depending on water flow and availability. Due to the habitat variability, the number of acres of suitable habitat that a spring provides is not quantifiable, but effects to the potential habitat is disclosed in the *Environmental Consequences* section.

Environmental Consequences

Alternative 1 and 2

Direct and Indirect Effects

All potential habitat available to robust larkspur and Arizona willow within the project boundary could potentially be affected by project activities. Vegetation treatments in all habitat types may cause some plant mortality due to trampling; however, the risk is low because implementation of stream management zones and other BMPs would reduce or eliminate the direct effect of roads and proposed treatments to riparian-wetland areas and stream-riparian areas that provide suitable habitat.

Prescribed fire may also cause mortality of individual plants. However, the intensity of the fire may either benefit or have a negative effect on these species. Low-intensity fires may remove shade cover and increase openings which would benefit the prorogation. However, higher-intensity fires would likely cause localized areas of increased surface water runoff and potential erosion, which would prevent the establishment of these species. Because project design criteria specify that prescribed fire would not be initiated in, but is allowed to move through riparian areas, fire intensity is generally expected to be low to moderate, thereby reducing risk.

Indirectly, soil compaction due to project activities has the potential to prevent all three of these species from spreading through seeds or roots. Soil compaction may occur due to machinery in areas of suitable habitat, especially in areas with wetter soils. This is especially likely in areas where road maintenance activities are occurring, within temporary access roads that are utilized for travel, or on the 5 miles of newly constructed roads (Alternative 2 only). It is expected that these impacts would only occur during project activities and habitat that is compacted would recover and re-vegetate over time, with exception of 5 miles of new system road under alternative 2, which would compact soils within the road prism for the foreseeable future. In addition, skid trails and landings would be excluded from riparian zones, and meadows, further decreasing risk of compaction in suitable habitats. Decommissioning of up to 13 miles of closed roads would potentially benefit the species by allowing existing road prisms to recover in the absence of all traffic, including illegal use.

Proposed range improvements include developments at 9 existing springs under Alternative 1 and 5 springs under Alternative 2. These developments would pipe a portion of water flow away from the spring site to a drinker available for livestock use. The springs would be fenced with wildlife-friendly fencing with spring water available at the site.

Up to 10.5 miles (approximately 32 acres) of riparian restoration (conifer removal) within the project area and adjacent to the Rio Fernando in the La Sombra and Capulin Campgrounds are expected to improve riparian habitats at the lowest elevations in the project area by removing competing conifer, reducing the potential for stand replacement fire within riparian habitats, thus reducing risk to existing plants and habitats.

Overall, the combinations of treatments proposed under this alternative would likely contribute to a healthier and more resilient watershed over time. This would benefit these species in the long-term as the landscape would move closer to historic conditions.

In summary, these species may experience short-term negative effects from project activities, but available habitat for future establishment would likely improve over time. Project activities would likely improve riparian function. Overall forest health would likely improve which could reduce the susceptibility of loss of these populations due to uncharacteristic wildfire.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the robust larkspur, the Pecos fleabane, and the Arizona willow. These activities include grazing and recreation, and historic timber management and prescribed fire projects.

It is likely this historical grazing had a negative effect on all of these plant species. The project boundary has historically been grazed for several hundred years. Currently, there are four active grazing allotments within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition in riparian and wetland areas. Overgrazing may have contributed to a loss of populations from foraging cattle and mortality due to trampling. In addition, plant growth was likely inhibited by a decrease in wetland and stream function because of increased erosion and soil compaction from hoof shear and widening of areas utilized for drinking and frequent crossing. Currently, grazing is actively managed and some site-specific areas with sensitive soils could be negatively impacted. Foraging by wild ungulates coupled with foraging from domestic ungulates may have a negative impact from trampling or consumption on local populations of all three plant species.

It is reasonable to assume recreational activities (such as off-road vehicle use, camping, hiking, horseback riding, among others) have occurred in the past and would continually occur within treatment areas during project implementation. The use of tents or other equipment and frequent soil compaction around popular camping sites could cause direct mortality and reduce plant growth for all of these species. This activity in conjunction with the project activities and active grazing could reduce populations of these species at localized sites. However, this project would also restrict vehicles from parking at dispersed camping sites on FR207, so this would likely benefit this species at other localized areas by preventing soil compaction and plant mortality.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects. Some of these include: the Ojito Fuelwood Project (fuelwood; 2000), Cejita Fuels Reduction/Ecosystem Restoration (fuelwood; 2000), Canada Maria Project (fuelwood; 2000),

Chamisal Ecosystem Restoration Project (fuelwood; 2006), the Montes Ecosystem Restoration Project (broadcast burn; 2008), El Valle prescribed fire (broadcast burn; 2011), La Joya Wildland Urban Interface (fuelwood; 2012), Ojito Partnership blocks (fuelwood and thinning; 2015 and ongoing), Entranas Green Fuelwood Area (thinning and fuelwood; 2016 and ongoing), and Ojo Sarco South Green Fuelwood Area (fuelwood and thinning; 2016 and ongoing). These combined activities likely opened the canopy and increased the potential for the robust larkspur and Pecos fleabane to propagate in areas adjacent to existing populations. These treatments likely contribute to an overall improved resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy populations of sensitive plant species.

Determination

Alternatives 1 and 2

Due to implementation of project design criteria that reduce potential for impacts to individual plants and habitats, alternatives 1 and 2 may effect individuals but is not likely to result in a trend toward listing or a loss of viability for the robust larkspur and Arizona willow.

Determination Summary

A list of all effects determinations for all species compared between alternatives is displayed in **Table** .

Table17. A summary of all effects determinations compared between alternative 1 and alternative 2 for all species within the wildlife report for the Pueblo Ridge project.

Species	Effect determination under alternative 1	Effect determination under alternative 2
<i>Threatened, endangered, and proposed species</i>		
Mexican spotted owl (<i>Strix occidentalis lucida</i>) - threatened	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>) - endangered	No effect	No effect
yellow-billed cuckoo (<i>Coccyzus americanus</i>) - threatened	No effect	No effect
Canada lynx (<i>Lynx canadensis</i>) - threatened	May affect, not likely to adversely affect	May affect, not likely to adversely affect
New Mexico meadow jumping mouse (<i>Zapus hudsonius luteus</i>) - endangered	No effect	No effect
<i>Forest Service Sensitive Species</i>		
Northern leopard frog (<i>Lithobates pipiens</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Bald eagle (<i>Haliaeetus leucocephalus</i>)	No effect	No effect
Northern goshawk (<i>Accipiter gentiles</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability

Species	Effect determination under alternative 1	Effect determination under alternative 2
American peregrine falcon (<i>Falco peregrinus anatum</i>)	No effect	No effect
White-tailed ptarmigan (<i>Lagopus leucurus</i>)	No effect	No effect
Burrowing owl – western (<i>Athene cumicularia hypugaea</i>)	No effect	No effect
Boreal owl (<i>Aegolius funereus</i>)	No effect	No effect
Cinereus (masked) shrew (<i>Sorex cinereus cinereus</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Western water shrew (<i>Sorex palustris navigator</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Spotted bat (<i>Euderma maculatum</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Pale Townsend's big-eared bat (<i>Corynorhinus townsendii pallascens</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
American pika (<i>Ochotona princeps saxatilis</i>)	No effect	No effect
Gunnison's prairie dog (<i>Cynomys gunnisoni</i>)	No effect	No effect
American marten (<i>Martes americana origenes</i>)	No effect	No effect
Rio Grande Sucker (<i>Castostomus plebeius</i>)	No effect	No effect
Rio Grande Chub (<i>Gila pandora</i>)	No effect	No effect
Roundtail chub (<i>Gila robusta</i>)	No effect	No effect
Rio Grande Cutthroat Trout (<i>Oncorhynchus clarki virginalis</i>)	No effect	No effect
Sangre de Cristo pea-clam (<i>Pisidium sanguinichristi</i>)	No effect	No effect
Nokomis fritillary (<i>Speyeria nokomis nokimis</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Yellow lady's slipper (<i>Cypripedium parviflorum var. pubescens</i>)	No effect	No effect
Alpine larkspur (<i>Delphinium alpestre</i>)	No effect	No effect
Robust larkspur (<i>Delphinium robustum</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Pecos (hairless) fleabane (<i>Erigeron subglaber</i>)	No effect	No effect
Arizona willow (<i>Salix arizonica</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability	May effect individuals but is not likely to result in a trend toward listing or a loss of viability

Management Indicator Species

The Carson National Forest Plan identified 11 wildlife species as indicators for ecosystem conditions (Table 18). These species act as surrogates for numerous other species that share similar life-histories and habitat requirements. These species were selected as indicators because of their sensitivity to habitat alterations and other stressors. Within the Forest Plan, each species is associated with one or more management areas that indicates its preferred habitat type. For purposes of this analysis, management areas are re-categorized into forest cover types to maintain consistency for suitable habitat considerations. Key habitat components for each species are also identified in **Table** and effects to these habitat components, if any, are analyzed in the *Potential for Effects* section.

An effect determination for both alternatives will be made for all management indicator species for both alternatives. The effects determinations are as follows:

- Would not affect forest-wide habitat and population trends: individuals and their habitats may be exposed to the action, but overall habitat and species population on the Carson National Forest would remain consistent or increase
- Would affect forest-wide habitat and population trends: individuals and their habitats may be exposed to the action and overall habitat and species population on the Carson National Forest could decline

Table 18. Wildlife species that serve as management indicator species on the Carson National Forest.

Management Indicator Species	Key habitat component	Habitat Occurrence	Comments/Determination
<i>Birds (5)</i>			
Brewer's sparrow (<i>Spizella breweri</i>)	Sagebrush	not present	The project area lacks sagebrush habitat. This project would not affect forest-wide habitat and population trends.
plain (juniper) titmouse (<i>Baeolophus ridgwayi</i>)	Piñon/juniper canopies	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
white-tailed ptarmigan (<i>Lagopus leucurus</i>)	Alpine tundra and subalpine deciduous shrub	not present	Treatment areas are below alpine tundra and subalpine deciduous shrub zones (10,500 feet). This species was also analyzed in the <i>Biological Evaluation</i> section of this document. Alternatives 1 and 2 <u>would not affect forest-wide habitat and population trends</u>
hairy woodpecker (<i>Picoides villosus</i>)	snags	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
wild turkey (<i>Meleagris gallopavo</i>)	old growth pine	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
<i>Mammals (4)</i>			
Rocky mountain bighorn sheep (<i>Ovis canadensis canadensis</i>)	alpine, subalpine tundra and mountain meadow grassland	not present	Treatment areas are below alpine and subalpine tundra biotic zones and do not include areas of high elevation grassland. Therefore, alternatives 1 and 2 <u>would not affect forest-wide habitat and population trends</u> .
Abert's squirrel (<i>Sciurus aberti</i>)	Interlocking canopies in ponderosa pine	present	Analysis required. Refer to the <i>Potential for Effects</i> section.

Management Indicator Species	Key habitat component	Habitat Occurrence	Comments/Determination
red squirrel (<i>Tamiasciurus hudsonicus</i>)	Mixed conifer	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
Rocky Mountain elk (<i>Cervus elaphus nelsoni</i>)	General forest	present	Analysis required. Refer to the <i>Potential for Effects</i> section.
Aquatic species (2)			
resident trout	perennial stream, riparian vegetation	present	Analysis required. The Rio Grande Cutthroat Trout was already analyzed within the <i>Biological Evaluation</i> section of this document. Therefore, this analysis only includes the Rainbow Trout (<i>Oncorhynchus mykiss</i>) and Brown Trout (<i>Salmo trutta</i>). Refer to the <i>Potential for Effects</i> section.
aquatic macroinvertebrates	perennial stream, riparian vegetation	present	Analysis required. Refer to the <i>Potential for Effects</i> section.

Potential for Effects

Key habitat components for the following species require further analysis:

- Plain (juniper) titmouse
- Hairy woodpecker
- Wild turkey
- Abert's squirrel
- Red squirrel
- Rocky Mountain elk
- Resident trout
- Aquatic macroinvertebrates

Plain (juniper) titmouse

Species Description

The plain titmouse is both a management indicator species for piñon-juniper habitat (USFS 2011b) and a high-priority migratory species (USFWS 2008). In New Mexico, the Plain titmouse is a yearlong resident species (BISON-M 2017r). Habitat for this species is abundant and well-distributed across the Carson National Forest (USFS 2011b). The Plain titmouse is most common in areas where juniper is the dominant cover type and where large, mature trees are present for nesting (Cicero et al. 2017). This species forages for both seeds and terrestrial invertebrates (Cicero et al. 2017; Christman 2001) with juniper and piñon seeds and acorns making up a large part of the winter diet (Christman 2001). The Plain titmouse forms permanent pair bonds, similar to the Oak titmouse (*B. inornatus*), and pairs defend their territory year-round (Cicero et al. 2017; Christman 2001). Nests are constructed in natural or secondary tree cavities in piñon-juniper woodlands (Stahlecker et al. 1989; Cicero et al. 2017; BISON-M 2017r); therefore, the retention of snags and older juniper trees is important (Cicero et al. 2017). Threats to this species include mechanical removal of trees in piñon and juniper woodland, wildfire, habitat conversion to rangeland, and commercial harvesting of piñon nuts (Cicero et al. 2017; USFS 2011b). However, selective cutting of piñon-juniper for fuelwood may have positive benefits to the plain titmouse when

larger trees are left for cavities and smaller trees are thinned to open the understory, which supports a better forage base for this species (USFS 2011b).

The plain titmouse is listed as globally secure and common throughout its range (NatureServe 2015j) and is considered secure, uncommon, but not rare with some cause for long-term concern in New Mexico (USFS 2011b; NatureServe 2015j). Breeding bird surveys indicate population declines within New Mexico since 1966, but the decline has stabilized over the last decade (Sauer et al. 2017; USFS 2011b). While the overall population information for the plain titmouse indicates a declining range-wide trend, surveys on the Carson National Forest indicate that the titmouse population is low, but currently stable (USFS 2011b and references therein; Sauer et al. 2017).

Affected Environment

As a management indicator species for piñon/juniper habitat, all 2,368 acres of piñon/juniper woodland habitat within the project area is considered suitable habitat for this species. Historic conditions for the piñon/juniper cover type within the project area suggest a fire regime generally characterized by frequent, patchy, low-severity fire, burning in areas where fuel was available and only occasionally becoming widespread when fuel and weather conditions were conducive. This would have kept thin-barked tree species such as junipers in low abundance or limited to microsites where fires occurred less frequently. Such a fire regime would have supported a variety in forest structure from relatively open stands with a continuous herbaceous understory to spatially heterogeneous stands, with openings, individuals, and aggregations of trees.

Approximately 77% of existing pinyon-juniper stand structure within the project area is currently dominated by moderate-aged and mature trees and dense canopies in VSS classes 4C and 5C (Table 15) with lesser amounts (23%) with large trees and open to moderate canopy densities in VSS classes 4B and 5B, which are expected to provide suitable habitat containing an herbaceous understory for juniper titmouse.

Potential treatments that could affect piñon/juniper canopies include: manual and mechanical vegetation treatments in piñon/juniper habitat, prescribed fire, road maintenance, road building, and temporary access for project activities. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 2,373 acres of pinyon-juniper habitat exists within the project area, 100 percent may be affected by proposed treatments under both action alternatives, but this represents only about 6 percent of existing pinyon-juniper stands on the Camino Real Ranger District. The plain titmouse may utilize this habitat for either nesting or foraging.

Cutting and removal of vegetation within the treatment areas is expected to result in an alteration of piñon-juniper canopy density and habitat during project implementation. Since these are non-migratory birds, cutting and removal of trees could negatively impact canopy habitat for both breeding and wintering individuals and pairs.). Removal of trees may decrease winter forage availability as this species feeds on juniper and piñon seeds. However, selective removal of some trees may benefit this species by

opening the understory and therefore increasing arthropod availability. Over time, the species would also benefit from increased tree vigor for nesting habitat due to the removal of smaller, competing trees.

Prescribed fire within the treatment areas would have similar effects to piñon-juniper canopy habitat. Immediately follow a prescribed fire, piñon/juniper canopy habitat may be reduced in some areas if the fire burns at a moderate or higher intensity. However, the use of prescribed fire may potentially increase breeding cavity availability due to some tree mortality and snag recruitment. Over the long-term, the use of prescribed fire would likely protect plain titmouse habitat from stand-replacing wildfire as fuel loading would be reduced.

Initial treatments proposed under both action alternatives would reduce tree and canopy densities primarily in existing VSS 4C and 5C, moving those stands to consist primarily of large trees and open canopies in VSS 5A (Table 15). While resilience to insect, disease, and stand replacement wildfire would be increased, and more consistent with historical range of variability, proposed treatments would reduce stand structure variability available to pinyon-juniper associated species, including juniper titmouse, in within the project area.

In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape, and increased understory vegetation, which are all beneficial to overall forest health and piñon/juniper canopy habitat for the plain titmouse. In addition, silviculture prescriptions would manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available. Therefore, over the long-term, suitable habitat for this species would likely increase in quality and have increased resilience to stand-replacing crown fire and insect and disease infestation.

In summary, habitat for the plain titmouse would likely improve in quality due to the activities under the action alternatives. Project activities would encourage development of uneven-aged and multistoried stands by increasing tree growth and vigor, improve habitat for nesting by recruiting snags, and would reduce susceptibility to pathogens and stand-replacing wildfire.

Table 19. VSS class existing and post-treatment pinyon-juniper

VSS Class	Existing (ac)	Alts 1 Post-Treatment (ac)	Alts 2 Post-Treatment (ac)
1	0	328	265
2	0	0	38
3A	0	30	0
3B	0	0	0
3C	0	0	0
4A	0	35	35
4B	361	223	223
4C	546	38	41
5A	0	676	581
5B	161	483	755
5C	1,280	71	71
6A	0	0	0

6B	20	0	0
6C	0	0	0
Grand Total (ac)	2,368	1,885	2,010

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on plain titmouse piñon/juniper habitat. These activities include previous and current timber management and prescribed fire projects.

Vegetation structure within pinyon-juniper habitats has been altered primarily by past fire exclusion. Historically, these stands would have been characterized as more open with lesser amounts of dense stands in areas of fire refugia. Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects in the piñon/juniper habitat. District-wide dead and down permits may also reduce the amount of available snags utilized by this species for nesting. These combined activities likely have had limited effect in opening the canopy and increasing understory productivity. Stand densification in pinyon-juniper habitats due to fire exclusion has likely had a negative effect on juniper titmouse by limiting herbaceous understory availability. Past treatments that reduced overstory canopy density have likely contributed to an overall improved habitat condition and resiliency to wildfires and pest and pathogens across the landscape that could potentially remove habitat for the plain titmouse.

Determination

Alternative 1 and 2

Due to the limited temporary negative effects on habitat and the likelihood of improved habitat quality after implementation activities, alternatives 1 and 2 would not affect forest-wide habitat and population trends for the plain titmouse.

Hairy woodpecker

Species Description

Hairy woodpeckers are widely distributed in mature woodlands and will utilize a variety of wooded habitats including riparian, piñon-juniper, ponderosa pine, mixed conifer, spruce-fir, and aspen (Jackson et al. 2002; USFS 2011b). Hairy woodpeckers forage for arthropods, fruits, and seeds by gleaning from tree surfaces, removing bark or excavating tunnels through wood to reach prey, capturing insects on the wing, or removing seeds from pine cones (Jackson et al. 2002). They breed from May-July (BISON-M 2017s).

Although this species is a commonly-observed forest generalist, it is limited by appropriate trees to excavate cavities for nests (Jackson et al. 2002). Due to this dependence, this species is an indicator for the presence of snags on the Carson National Forest (USFS 2011b). Microclimate of a snag is important to this species as snags exposed to sun or other elements that promote drying will not support fungal decay, which is associated with excavations (Jackson et al. 2002). Hairy woodpeckers will utilize both live and dead trees to excavate a nesting cavity. Holes are excavated into the living trunk of a tree with fungal rot or in the underside of a limb with a lean from vertical (Jackson et al. 2002).

Threats to this species include invasive species competition, excessive gathering of dead and down fuelwood, reducing fuels that provide habitat, clearcutting, removal of snags, and loss of old growth trees (Jackson et al. 2002; USFS 2011b). However, maintaining large trees, downed logs, and snags as well as reducing road densities are beneficial to this species as nesting and foraging habitat and prey availability will be maintained or increased (USFS 2011b). In addition, prescribed fire treatments provide additional wintering foraging opportunities for hairy woodpeckers by attracting prey items (Pope et al. 2009).

The hairy woodpecker is considered globally secure and common throughout its range (NatureServe 2015k) and is considered secure, common, widespread and abundant in New Mexico (USFS 2011b; NatureServe 2015k). Breeding bird surveys indicate a slight decrease but non-significant population trend in the state (USFS 2011b). Surveys on the Carson National Forest indicate that hairy woodpecker population trends are stable (USFS 2011b).

Affected Environment

Due to the fact that the hairy woodpecker is a forest generalist and an indicator species for snags, all forest cover types were considered suitable habitat for this species. Snags within all 9,709 acres within the project area could potentially be utilized by either foraging or nesting hairy woodpeckers. The location and distribution of utilized snags is unknown, so it is likely the actual affected habitat is less than 100 percent. Effects to snags are disclosed within the *Environmental Consequences* section.

Potential treatments that could affect this species include: manual and mechanical vegetation treatments in all habitat types, prescribed fire, and road maintenance and temporary access for project activities. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 100 percent of suitable habitat within the entire project boundary would be affected by implementation activities. The location and distribution of utilized snags is unknown, so it is likely the actual affected habitat is less than 15 percent.

Cutting and removal of fuelwood within the proposed action areas has the potential to reduce available snag habitat if snags are removed. The removal of trees may also temporarily decrease forage availability for this species as prey individuals would likely be destroyed during project activities. However, project design features require that existing snags would be designated as leave trees outside of landing areas or where they otherwise do not pose a safety hazard. Therefore, most existing snags are expected to be retained within treatment units.

Decommissioning of approximately 13 miles of would likely have a positive effect by limiting snag removal due to illegal firewood harvest.

Prescribed fire would likely result in a neutral benefit to snag habitat. Some snag habitat may be lost during prescribed fire activities from burning or hazard tree removal; however, some snags may be created due to tree mortality. Prescribed fire may weaken some trees by allowing insect or disease entry, which may potentially recruit additional snags.

In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape,

and increased understory vegetation, which are all beneficial to overall forest health. In addition, silviculture prescriptions would manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. This would ensure snag availability of larger trees in the future. Prescribed fire would likely burn with a variety of intensities across the landscape and may recruit additional snags. Therefore, over the long-term, suitable habitat for the hairy woodpecker would likely persist over time. Forested stands would also benefit from an increased resilience to stand-replacing crown fire and insect and disease infestation and snags would likely remain available across the landscape.

In summary, impacts to snags would likely be minimal. Snags would be both removed, created, and retained due to activities under both action alternatives. Project activities would encourage development of uneven-aged and multistoried stands by increasing tree growth and vigor and would likely ensure snag recruitment and available habitat for this species over time.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on snags utilized by the hairy woodpecker. These activities include historic timber management and prescribed fire projects.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects listed in Table 8. District-wide dead and down permits and latilla permits may also remove some standing snags available across the landscape. These combined activities likely both removed and recruited additional snags across the landscape. However, these activities likely resulted in the improved stand condition and forest health across the landscape, which likely has a cumulative benefit for snag retention and creation unless excessive snags are harvested or many large, mature trees are poached within designated fuelwood units. In addition, these treatments contribute to an overall improved resiliency to wildfires and pest and pathogens across the landscape. Although additional snags would be recruited due to these uncharacteristic events, it is likely contagious acres of standing dead trees would not support the microclimate conditions necessary for a hairy woodpecker to excavate and utilize the snags.

Determination

Alternatives 1 and 2

Due to the emphasis that snags would be retained or and likely recruited due to project activities, alternatives 1 and 2 would not affect forest-wide habitat and population trends for the hairy woodpecker.

Wild turkey

Species Description

Of the three subspecies of wild turkey in New Mexico, the Carson National Forest is host to the Merriam's turkey (BISON-M 2017t; hereafter referred to as "wild turkey"). This upland game bird is a management indicator species for the presence of old growth pine (USFS 2011b) with ponderosa pine as an essential component of its permanent habitat (BISON-M 2017t). Wild turkey habitat on the Carson National Forest is considered abundant and well distributed, but is heavily dominated by mid-seral conditions (USFS 2011b). This species will utilize other habitats associated with ponderosa pine stands, such as the piñon-juniper woodland transition zone, pine-oak habitat, and the mixed conifer transition zone (USFS 2011b; McRoberts et al. 2014).

There are three main habitat components for suitable habitat: water, roost sites, and summer or brooding areas (NMDGF 2013). In New Mexico, free water is essential as vegetation may not be able to meet moisture requirements (NMDGF 2013), so turkeys will usually nest or roost within one-third to one-half of a mile from a water source (BISON-M 2017t; Boeker and Scott 1969). Wild turkeys prefer to roost in tall mature or old growth ponderosa pines with open crowns and large horizontal branches, usually on a steep slope (Boeker and Scott 1969; NMDGF 2013, BISON-M 2017t). As ground nesters, nest sites typically consist of areas with large diameter trees and horizontal undergrowth that provides concealment, often on steep slopes (Wakeling et al. 1998; NMDFG 2013b; McRoberts et al. 2014). Eggs are usually laid around 1 May and hatch around early June (McRoberts et al. 2014). Wild turkeys forage on the ground or within shrubs or low trees for mast, fruits, forbs and grasses, and sometimes arthropods (McRoberts et al. 2014). In fall and winter, mast produced by ponderosa pine, piñon pine, and oak are important food sources (USFS 2011b and references therein; NMDGF 2013; McRoberts et al. 2014). Due to the importance of mature ponderosa pine for this species, retention and restoration of this habitat is important. Threats to this species include forest succession, long-term fire suppression, some overstory removal, drought, wildfire, and overgrazing (USFS 2011b; McRoberts et al. 2014).

Throughout its range, wild turkeys are considered globally secure and common (NatureServe 2015l) and common, widespread, and abundant in New Mexico (USFS 2011b; NatureServe 2015l). Breeding bird surveys in New Mexico have detected an upward population increase since 1966 (USFS 2011b; Sauer et al. 2017). Wild turkey populations on the Carson National Forest are considered to be in a stable to upward trend (USFS 2011b).

Affected Environment

As an indicator species for old growth pine, all ponderosa pine stands (2,783 acres) within the project area were considered for analysis. Effects to old growth pine are disclosed within the *Environmental Consequences* section.

Potential treatments that could affect this species include: manual and mechanical vegetation treatments in ponderosa pine and mixed-conifer habitat, prescribed fire, and old-growth allocation. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 100 percent of suitable habitat in ponderosa pine and mixed-conifer habitats could potentially be affected by project activities. Wild turkeys could use this habitat for nesting, roosting, or foraging activities.

Vegetation treatments, product removal, and prescribed fire could affect mature conifer trees used as roosting habitat. Some large trees that may be suitable for roosting currently or may develop into suitable trees may be removed due to project activities. However, selective removal via group selection may benefit this species by changing the tree structure to more desired conditions and increasing the patchiness of tree groups. Both action alternatives would reduce overstory densities in large tree classes (VSS classes 5 and 6) by thinning from below resulting in a net increase in the VSS in both classes of approximately 602 acres under Alternative 1 and 574 acres under Alternative 2 (table 16). This would also create more vigorous trees for roosting as there would be less competition for resources with neighboring trees. Prescribed fire is expected to have similar effects by potentially causing mortality of current

roosting trees or trees that may be suitable for future roosting. However, prescribed fire would also contribute towards increasing tree vigor, which may recruit more roosting trees over the long-term.

In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape, and increased understory vegetation. In addition, silviculture prescriptions would manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available. These improvements are all beneficial to overall forest health and would likely recruit and support mature roost trees for the wild turkey.

Old-growth allocation areas likely result in a neutral effect to wild turkey roost tree habitat. Within the project boundary, approximately 881 acres of ponderosa pine would be allocated towards growing an old-growth stand. This does not prevent future treatments from occurring in these areas; however, it does prevent removal of trees in larger age classes (larger VSS 4 and above). In general, large and mature trees are an important structural component for this species as they are utilized for roosting. However, higher large tree densities can promote an even distribution of age classes resulting in decreased tree vigor and tree health over time, which can lead to an increase in susceptibility to pathogens and stand-replacing wildfire. In contrast, in stands where there is not an excessive number of old and mature trees, allocating these acres can be beneficial to the wild turkey as growth of these trees would be promoted which would likely improve availability of roost trees within those forested areas.

In summary, roost tree quality and availability would likely improve in quality over time equally due to the activities in alternatives 1 and 2.

Table 20. Existing and post-treatment VSS class amounts, ponderosa pine

VSS Class	Existing (ac)	Alternative 1 Post-treatment (ac)	Alternative 2 Post-treatment (ac)
1	0	135	107
2	40	0	7
3	684	183	179
4	849	1,014	1,247
5	649	1,109	1,086
6	554	704	699
Total	2,776	3,145	3,325

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on roost trees used by the wild turkey. These activities include historic timber management and prescribed fire projects.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects listed in Table 8. These combined activities likely opened the canopy and improved stand condition and roost tree vigor across the landscape. These treatments likely have a cumulative benefit to for roost tree quality, retention, and recruitment, unless excessive large, mature trees are harvested or poached within designated fuelwood units. These treatments would likely contribute to

an overall improved resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy roost trees utilized by this species.

Determination

Alternatives 1 and 2

Due to the limited temporary negative effects on this species, retaining current roost trees, increasing roost tree vigor, and recruitment of large, mature trees used for roosting, alternatives 1 and 2 would not affect forest-wide habitat and population trends for the wild turkey.

Abert's squirrel

Species Description

Abert's squirrels will utilize a variety of habitats, such as mixed-conifer, spruce-fir, and piñon-juniper (Doumas et al. 2015), although they are highly dependent upon ponderosa pine for food, shelter, breeding habitat, and protection (Keith 1965; BISON-M 2017u). Abert's squirrels consume ponderosa pine twigs, cones, seeds, bark, buds, and flowers as well as mushrooms, fungi, piñon pine, acorns, and carrion (Keith 1965; Whitaker 1996; Dodd et al. 2003; Keith 2003; NatureServe 2015m; BISON-M 2017u). Nests are composed of pine twigs or mistletoe within ponderosa pine branches or trunk-branch junctions, and squirrels may build and occupy several nests during a year (Keith 1965; Farentinos 1972). Young are born in early spring (March or April) and are independent by late June (Whitaker 1996). Threats to this species include habitat loss due to cumulative effects of forest succession, long term fire suppression, overstory removal prescriptions, wildfire, and drought (Keith 2003; USFS 2011b).

Large ponderosa pine with interlocking canopies is considered an important structural component for Abert's squirrel habitat (Dodd et al. 2003; Frey 2006; USFS 2011b) and thus the Abert's squirrel is a management indicator species for this habitat feature. Un-even aged stands with small, even-aged groups of ponderosa pine connected by canopy corridors provides ideal habitat (Keith 2003; USFS 2011b). Management practices that can benefit this species include group selection, with retention of pines 15-20 inches diameter breast height, with stands of large pine densities greater than 200 trees per acre (Keith 2003; USFS 2011b and references therein). The current dominance of mid-seral ponderosa pine on the Carson National Forest reflects poor to fair habitat conditions, although there is an upward trend due to current management practices including thinning from below, which can improve foraging conditions (USFS 2011b).

Throughout its range, the Abert's squirrel is considered globally secure and common (NatureServe 2015m) and is apparently secure, uncommon but not rare, and usually widespread in New Mexico (USFS 2011b; NatureServe 2015m). Small mammal inventories conducted on the Carson National Forest indicate Abert's squirrel populations are at low levels (e.g. Frey 2004a; Frey 2006; USFS 2011b and references therein) and this species experienced regional declines from 2001 to 2004 (USFS 2011b). Moreover, this species experiences population fluctuations with no danger of extinction (Keith 2003). From 2002-2011, populations on the Carson National Forest have increased and are approaching the low end of the range of optimum density (USFS 2011b).

Affected Environment

Although Abert's squirrels can be found in limited numbers within ecotones surrounding ponderosa pine habitat, most of its life history occurs within the ponderosa pine habitat. Thus only the ponderosa pine cover type was considered suitable habitat for purposes of this analysis. Approximately 100 percent of the

2,783 acres of ponderosa pine habitat within the project area, equating to less than 5 percent of habitat available on the Camino Real Ranger District, could potentially be affected by project activities.

The Abert's squirrel is an indicator species for interlocking ponderosa pine canopies due to its dependence on this habitat. Effects to these canopies are disclosed within the *Environmental Consequences* section. The current structural conditions within ponderosa pine are dominated by even-aged and even-sized stand structures, generally consisting of stands within the VSS 4, 5, and 6 stages (see table 20, above).

Potential treatments that could affect this species include: manual and mechanical vegetation treatments in ponderosa pine habitat, prescribed fire, and temporary access for project activities.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 100 percent of the ponderosa pine habitat within the project boundary could be affected by project activities. Although most of these areas consist of smaller diameter even-sized stands, they likely support some breeding and/or foraging Abert's squirrels.

At the local scale, vegetation treatments including cutting and removal of trees may reduce some interlocking canopies utilized by this species. However, selective removal via group selection may benefit this species by changing the tree structure to more desired conditions and increasing the patchiness of tree groups. This would maintain interlocking canopy structure within tree groups but would likely decrease interlocking canopies between patches. In the long-term, remaining trees should become more vigorous which would result in increased interlocking canopies and increase suitable habitat for this species. Stands with moderate to dense overstories in VSS classes 5B, 5C, 6B and 6C likely contain interlocking crowns, larger trees, and adequate trees/acre (i.e., over 200) to serve as suitable habitat for Abert's squirrel. However, most ponderosa pine stands within the project area are even-aged and lack the uneven-aged grouping described by Keith (2003) as optimal for this species. Silvicultural treatments proposed under both action alternatives consist of applying uneven-aged management in ponderosa pine. While treatments would benefit structure heterogeneity within stands under both action alternatives, some moderate and dense overstory stands would be moved to open canopy VSS A classes that may not support larger patches of interconnected crowns. Alternative 1 is expected to reduce available habitat by about 434 acres, while the effect under alternative 2 would be less by reducing habitat by 250 acres (table 17). These effects are expected to last up to 10 years (short-term) until crowns again become denser and provide more suitable habitat.

Prescribed fire may have similar negative direct effects on interlocking forage habitat as cutting and removal of vegetation. Some interlocking canopies would likely be affected as it is expected some areas would likely burn with a higher intensities, which may create some open pockets. However, the habitat would likely benefit in the long-term from prescribed fire as tree vigor would likely be promoted as a result of these activities. Over time, this may improve interlocking canopy habitat as stands would benefit from less resource competition and would likely increase interlocking canopy habitat.

Overall, the combination of vegetation treatments and prescribed fire may negatively impact some habitat in the short-term, but would likely improve habitat quality and structure within ponderosa pine stands in the long-term. Vegetative prescriptions would manage for uneven-age forest stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels. Silviculture prescriptions would also manage for old age trees such that as much old forest structure as possible is sustained over

time across the landscape. Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available. In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape, and increased understory vegetation, which are all beneficial for the health and resiliency of ponderosa pine habitat. This would likely improve habitat and interlocking canopies for this species in the long-term.

Temporary access for project activities may result in the removal of some trees that provide interlocking canopies within very specific sites. However, it is unlikely that the removal of these trees to provide access would have a detrimental negative effect to interlocking canopies as a whole across the project area. Abert's squirrel transportation across these canopies may be limited in these areas due to this loss. However, it is extremely likely patches will maintain interlocking canopies elsewhere.

Table 21. Existing and post-treatment VSS size and density class amounts, large ponderosa pine

VSS	Existing Condition (ac)	Alternative 1		Alternative 2	
		Post-Rx (ac)	Change (ac)	Post-Rx (ac)	Change (ac)
5B	154	251	97	256	102
5C	410	222	-188	280	-142
6B	385	85	-300	162	-221
6C	57	25	-32	25	-32
Total	1,006	583	-434	765	-250

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the interlocking canopy habitat utilized by Abert's squirrels. These activities include historic timber management and prescribed fire projects.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects, listed in Table 8. These combined activities likely cause an immediate decrease of interlocking canopies within dense stands. However, the health and vigor of remaining trees likely improved as a result. Over time, this likely caused the treated stands to move towards more desired conditions within the ponderosa pine habitat. Interlocking canopies would likely increase as remaining trees would be more vigorous and a mosaic of trees in a variety of structural stages was favored. The improved stand condition and forest health across the landscape likely has a cumulative benefit to the Abert's squirrel because these treatments contribute to an overall improved stand health and vigor and an increased resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy habitat for this species.

Determination

Alternatives 1 and 2

Due to the limited temporary negative effects on overall habitat quality over time, alternatives 1 and 2 would not affect forest-wide habitat and population trends for the Abert's squirrel.

Red squirrel

Species Description

Red squirrels are usually found in mixed conifer although they will also inhabit spruce-fir habitats (Frey and Yates 1996; USFS 2011b; BISON-M 2017v). Red squirrels will occasionally occur in ponderosa pine forests if the area is adjacent to mixed conifer habitat (Ferner 1974; Frey 2004b and references therein; Doumas et al. 2015). Due to its presence within mixed-conifer, the red squirrel is a management indicator species for this habitat. Red squirrels prefer habitats with greater than 60 percent canopy closure (Vahle and Patton 1983; Reynolds et al. 1992) with mature and old-growth trees (Vahle and Patton 1983; Patton and Vahle 1986; Haughland and Larsen 2004). This species relies on these trees for nesting habitat and as a food source.

Red squirrels build and utilize a variety of nesting habitats, including constructing dreys (stick or leaf nests) within branches of a large tree (USFS 2011b), mistletoe formations in Douglas-Fir (Patton and Vahle 1986), or natural cavities or underground dens (Flyger and Gates 1982). Young are born in March through May (Flyger and Gates 1982).

Although red squirrels will eat a variety of items, including evergreen terminal buds, seeds, sap, berries, bark, fungi, and insects, they primarily harvest and cache immature cones from mixed conifer tree species (Flyger and Gates 1982; NatureServe 2015n). The caches (middens) are typically found in hollow trees, dens, or at the base of a tree (Flyger and Gates 1952). Usually there is one large, centralized midden with several smaller secondary middens within a territory (Patton and Vahle 1986). These middens are extremely important to red squirrel survival as they may store enough food to last one or two seasons (Gurnell 1984). Mature trees are found supporting or in close proximity to a majority of middens (Patton and Vahle 1986; USFS 2011b). These trees produce the most cones and provide adequate shading in conjunction with other vegetation to prevent the stored cones from opening (USFS 2011b). At least three or four conifers larger than 15 inches DBH per acre are necessary for cone production and one or more trees greater than 20 inches DBH are necessary for primary middens (USFS 2011b).

Threats to this species include logging activities in mature tree stands and uncharacteristic wildfire (USFS 2011b). However, thinning smaller diameter trees is beneficial to this species as it will release and promote larger trees and reduce fuel loading for wildfire (USFS 2011b). Thinning and prescribed fire treatments to control dense conifer reproduction may increase desired mixed conifer habitat (USFS 2011b).

The red squirrel is considered globally secure and common (NatureServe 2015n) and is secure, common, widespread, and abundant in New Mexico (USFS 2011b; NatureServe 2015n). Surveys for this species on the Carson National Forest indicate that red squirrels prefer habitats where spruce was dominant and populations are consistent with the rest of the state and are stable throughout its range (Frey 2004b; USFS 2011b). The Carson is currently supporting stable populations of this species and habitat condition is relatively good with an upward trend (USFS 2011b).

Affected Environment

The red squirrel is an indicator species for the presence of mixed conifer, thus mixed-conifer habitat was considered suitable habitat for this analysis. Although red squirrels will occupy ecotones adjacent to mixed-conifer, it principally utilizes the mixed-conifer habitat type. There are approximately 3,859 acres of mixed conifer within the project boundary.

Potential treatments that could affect this species include: manual and mechanical vegetation treatments in mixed-conifer habitat, prescribed fire, and old-growth allocation. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Approximately 100 percent of mixed-conifer habitat within the project boundary, equaling about 3 percent of mixed conifer on the Camino Real Ranger District, may be affected by project activities. Red squirrels could use this habitat for nesting, foraging, or creating middens. Not all of the aforementioned acres would support this species as it relies on several large trees and interlocking canopies within an area to support nesting habitat, cone production, and middens. Mature and old stands with moderate to dense canopies (VSS 5B, 5C, 6B, and 6C) are currently available as suitable habitats within the project area.

Vegetation treatments and prescribed fire in the mixed-conifer could affect habitat for the red squirrel. Amounts of suitable habitat in VSS 5B, 5C, 6B, AND 6C would only change slightly in the post-treatment condition. Alternative 1 is expected to increase available habitat by about 138 acres, while alternative 2 would slightly reduce available habitat by 79 acres over the short-term (table 18). Similarly, prescribed fire may reduce some local habitat by burning at a moderate or high intensity, which may destroy trees used as potential habitat. In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape, and increased understory vegetation. In addition, silviculture prescriptions would manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. These improvements are all beneficial to overall forest health and suitable habitat for the red squirrel. Suitable habitat for this species would likely increase in quality and have increased resilience to stand-replacing crown fire and insect and disease infestation.

In summary, suitable habitat for the red squirrel would likely improve in quantity under alternative 2 in the short-term, and in quality over time under both action alternatives due to the activities under the action alternatives. The overall function of mixed conifer habitat would likely improve over time. Improving these habitats would also promote increased tree vigor which may improve foraging and breeding habitat as well as promote midden establishment over time.

Table 22. VSS class amounts, existing condition and post-treatment, large mixed conifer

VSS	Existing Condition (ac)	Alternative 1		Alternative 2	
		Post-Rx (ac)	Change (ac)	Post-Rx (ac)	Change (ac)
5B	503	530	27	503	-30
5C	44	79	35	40	-4
6B	132	209	77	87	-45
6C	39	39	0	39	0
Total	718	856	+138	639	-79

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on the mixed conifer habitat utilized by the red squirrel. These activities include historic timber management and prescribed fire projects.

Timber stands adjacent to treatment areas containing mixed-conifer habitat have been altered by previous and current timber, fuelwood, and prescribed fire projects, listed in Table 8. These combined activities likely cause an immediate decrease of interlocking canopies, some tree mortality, and loss of middens within dense stands. However, the health and vigor of remaining trees likely improved as a result. Over time, this likely caused the treated stands to move towards more desired conditions within the mixed-conifer habitat. The improved stand condition and forest health across the landscape likely has a cumulative benefit to the red squirrel because these treatments contribute to an overall improved stand health and vigor and an increased resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy habitat for this species.

Determination

Alternatives 1 and 2

Due to the short-term negative effects on habitat and overall improvement of habitat quality over time, alternatives 1 and 2 would not affect forest-wide habitat and population trends for the red squirrel.

Rocky Mountain elk

Species Description

The entirety of Carson National Forest is considered a key habitat component for Rocky Mountain elk (USFS 2011b). This species utilizes a variety of habitats throughout the year, including high mountain meadows or stream bottoms and riparian areas in the summer to south-facing, lower-elevation slopes with good cover in the winter (Irwin 2002; USFS 2011b). Thus elk are management indicator species for general forest habitats. Rocky Mountain Elk breed in autumn (September – October) and calve in late spring (May – June), consistent with the seasonal fluctuations of forage (Raedeke et al. 2002). Elk are intermediate feeders and will consume a variety of forage, including grass, forbs, and woody browse, depending on seasonal availability (Cook 2002; USFS 2011b).

Although elk will utilize a variety of habitats in various successional stages, elk are sensitive to recreational activity and the presence of roads (Lyon and Christensen 2002; Naylor et al. 2009; USFS 2011b; McCorquodale 2013). In general, high road densities, traffic, and human disturbance through recreation have a negative effect on elk (McCorquodale 2013). Some of these negative effects include: increases in stress hormones near roads, avoidance behavior of roads and human activity, reduction in foraging time due to disturbance, and increased risk of mortality (reviewed in McCorquodale 2013).

Threats to this species include cumulative effects of dense forest conditions following heavy logging and long-term fire suppression, human disturbance, and growing private development in winter range (USFS 2011b). However, timber harvest, thinning, prescribed fire and wildfire are potentially beneficial for this species as dense forest conditions and fuel loading is reduced with effective treatments (USFS 2011b).

Throughout its range, elk are considered globally secure and common (USFS 2011b; NatureServe 2015o). The Rocky Mountain elk population trend on the Carson National Forest is considered stable (USFS 2011b). The 2010 population estimate ranged from 350 to 2,604 individuals on the Camino Real Ranger

District (USFS 2011b). Additionally, the habitat condition and trend on the Carson National Forest is fair and stable (USFS 2011b).

Affected Environment

As elk are indicators of general forest, all of the acres within the proposed treatment areas were considered habitat. Thus all 9,709 acres across all habitat types is considered suitable habitat for this species. This equates to about 3 percent of habitat on the Camino Real Ranger District, and approximately 0.6 percent of habitat available forest-wide.

Potential treatments that could affect this species include: manual and mechanical vegetation treatments in all habitat types, prescribed fire, and road maintenance and temporary access for project activities. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Elk may use habitats within the treatment areas in both summer and winter for bedding, foraging, and calving. Due to the proximity to roads and recreational activities, elk are not likely to consistently remain within treatment areas but would likely move across the landscape.

Noise from vehicular traffic and machinery from project activities (e.g. cutting and removing trees, improving or creating system roads, or cutting and scattering slash) may temporarily displace any elk present in the area. Any present individuals would likely move out of the disturbed area into adjacent, undisturbed habitat. This disturbance would likely be short-term and localized in nature, consisting of phased tree removal and traffic over the summer months. Displaced elk would likely move into adjacent, undisturbed habitat and would likely move back into treatment areas after project activities have ceased.

The scope of the landscape-level analysis area for which big game cover is analyzed consists of the area within the Pueblo Ridge project area, in addition to Forest Service-administered lands within the two HUC 12-level subwatersheds that encompass the project area (Outlet Rio Fernando del Taos and Headwaters Rio Fernando del Taos). This area was identified because a) it is larger than the project area, and b) is expected to better represent big game seasonal ranges on Forest Service-administered lands within the upper Rio Fernando del Taos drainage. This area is referred to below as the Upper Rio Fernando.

Forest Service-administered lands in the Upper Rio Fernando drainage totals 36,660 acres. Existing vegetation data only provides information for stands with 60+ percent canopy closure. It is estimated that about half of these stands contain 70+ percent canopy cover based on known ratios in the Pueblo Ridge project area, and accounting for increased stand densities in more mesic north-facing portions of the drainage. Existing thermal cover within the drainage is estimated at 14 percent. Post-treatment, under both alternatives thermal cover is reduced, but retained above 10 percent with remaining cover estimated at 11.9 percent under alternative 1 and 12.2 percent under alternative 2 (table 23). Therefore, both alternatives are expected to retain thermal cover in excess of 10 percent at this scale.

Hiding cover is expected to exist where canopy cover exceeds 60 percent and stand structure is multi-storied for all forest types. Existing data available for vegetation outside the project area identifies stands with 60 percent or greater canopy cover, but lacks information pertaining to stand structure. Based on

known ratios from the Pueblo Ridge project area, about 55 percent of forested stands shown as 60-plus percent canopy closure in the available dataset consist of stands with multi-storied structure. Under the existing condition, the Upper Rio Fernando contains an estimated 7,133 acres of hiding cover (approximately 19 percent of total acres). Treatments under alternatives 1 and 2 would reduce available hiding cover, with approximately 12.6 percent retained under alternative 1 and 13.1 percent retained under alternative 2 (table 23).

Elk habitats within the project area and the Upper Rio Fernando drainage generally contain low amounts of available forage (i.e., vegetation structure stages with less than 30-40 percent canopy cover). Approximately 3,359 acres of forage currently exists within the Upper Rio Fernando, 651 acres of which are located within the Pueblo Ridge Project Area, equating to a 78:22 cover to forage ratio. A 40:60 ratio of cover to forage habitat is considered optimum for elk habitat by several authors (Thomas et al. 1979, Smith 1985, Brown 1991). Both alternatives would increase available forage and move cover:forage ratios toward more favorable levels at this scale (table 23).

Table 23. Existing and post-treatment big game cover amounts, Upper Rio Fernando drainage

Habitat	Existing Condition acres (%)	Alternative 1 acres (%)	Alternative 2 acres (%)
Thermal cover	5,080 (14%)	4,329 (11.9%)	4,438 (12.2%)
Hiding cover	7,133 (19%)	4,626 (12.6%)	4,799 (13.1%)
Available forage	3,359 (9.1%)	8,712 (23.8%)	7,895 (21.4%)
Cover:Forage Ratio	78:22	51:49	54:46

Vegetation and fuels treatments under the action alternatives combine to increase forage availability and decrease available cover. Cover and forage availability modeled after treatments are implemented show that both action alternatives move toward more favorable amounts of cover and forage in comparison the existing condition. However, the reduction of available high quality cover (i.e., 60 percent canopy cover or greater in multi-storied stands as well as stands with 70 percent or greater canopy cover) is more pronounced at the project area scale under the action alternatives. The effect is reduced local availability of cover and increased sight distance that may cause increased displacement of elk from habitats within 0.5 mile to one mile of open roads during hunting seasons (Hillis et al. 1991, Weber et al. 2000, Ranglack et al. 2017, Lemkuhl 1981), or movement to areas with more abundant overhead cover during periods of weather extremes. This effect would last past 10 years before stands currently containing less than 60 percent canopy cover transition to high quality cover via continued overstory and understory development.

Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available. At the local scale, low to moderate prescribed fire intensities would decrease forage availability in the short-term, but herbaceous vegetation would recover and likely increase in the years following the prescribed fire. In areas where pockets are created, it is likely herbaceous vegetation would become established which would provide additional foraging habitat for this species. In the long-term, prescribed fire would assist with encouraging the patchy mosaic habitat structure that would improve both foraging habitat and adequate cover for elk.

The addition of 5 miles of new system road (Alternative 2 only), road improvements and temporary road access would likely have a negative effect on elk as this species is sensitive to human disturbance, the presence of roads, and recreational activities. The use of temporary roads may increase elk exposure to

human activity as people may travel into elk habitat. Increased vehicular traffic and human presence would likely alter elk behavior and cause avoidance of the project areas. Elk behavior should return to normal after implementation if the temporary roads are effectively closed and access is controlled. Decommissioning up to 13 miles of closed road is likely to benefit elk habitat by reducing the potential for unauthorized use of these roads.

Project activities may cause some short-term displacement of individual elk, but displaced elk can move into adjacent, undisturbed habitat. Improving the habitat by improving ecosystem function would also move the forest into a healthier and more resilient condition that may withstand wildfire, pathogens, or a beetle outbreak, which would help sustain populations of elk.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on habitat utilized by Rocky Mountain elk. These activities include grazing, recreation, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, are four active grazing allotments within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition and reduced the amount of forage available for elk. Historical grazing would had a negative effect on elk due to the loss of forage, changes to timber stand structure used for cover, and removal of fuels for natural wildfires that would maintain an adequate forage base. Currently, grazing is actively managed and some site-specific areas with herbaceous cover could still be negatively impacted. Additional sunlight from tree removal and prescribed fire would encourage the growth of ground cover which is often used as forage for both cattle and elk. In addition, ground cover may be disturbed within the treatment areas during implementation activities due to machinery which may cause an additional reduction in forage availability. The lack of suitable forage may cause a temporary displacement of elk, but these individuals would likely move to adjacent, undisturbed habitats and would return once the area is rested from grazing and vegetation recovers from project activities.

Recreational activities (such as off-road vehicle use, camping, hiking, horseback riding, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance is likely short-term because project and recreation activities would not occur without interruption for extended periods of time. In addition, hunting pressure during the fall may overlap with some project activities, so it is likely elk may relocate to adjacent, undisturbed habitat and would return when recreation and project activities cease.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects, listed in Table 8. District-wide dead and down permits and latilla permits may also change stand composition and the amount of downed logs that contributes to cover habitat for elk. These combined activities likely opened the canopy and increased grass and shrub availability that could be utilized as both forage and cover. The improved stand condition and forest health across the landscape likely has a cumulative benefit to elk, as these treatments contribute to an overall improved resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy forested habitat.

Determination

Alternatives 1 and 2

Due to the limited negative effects on this species and its habitat and overall habitat quality improvements over time, on habitats that equate to approximately 3 percent of those available district-wide and 0.6 percent forest-wide, alternatives 1 and 2 would not affect forest-wide habitat and population trends for Rocky Mountain elk.

Resident trout and macroinvertebrates

Resident trout species within the project boundary include the Rainbow Trout (*Oncorhynchus mykiss*), and Brown Trout (*Salmo trutta*). Due to similar habitat requirements and life history, Rainbow Trout and Brown Trout are analyzed together. Macroinvertebrates are also included in this analysis due to the similar habitat occupied by these species.

Species Description

All resident trout on the Carson National Forest are cool-water species and prefer perennial water with temperatures between 5°C and 18°C (USFS 2011b). They are an indicator species for the presence of perennial water and riparian vegetation on the Carson National Forest. In general, resident trout prefer rocky substrates, adequate pools, and undercut banks or overhanging vegetation as habitat (USFS 2011b) although specific habitat requirements vary by species. Rainbow Trout spawn in spring with increasing water temperature and streamflow (Sublette et al. 1990; BISON-M 2017w) whereas Brown Trout spawn in fall with decreasing water temperature (Sublette et al. 1990; BISON-M 2017x). Trout are opportunistic feeders and are predominately insectivorous, although depredation on fish and crustaceans has been documented (Angradi and Griffith 1990; Kelly-Quinn and Bracken 1990; Rinne 1995c). Neither the brown trout or the rainbow trout are naïve species, Threats to these species include disease (e.g. whirling disease), habitat loss and degradation, sedimentation, and changes in hydrology or water diversions (Calamusso and Rinne 1999; USFS 2011b). In general, the population trend for resident trout species on the forest is stable (USFS 2011b).

Aquatic macroinvertebrates are used as a management indicator species for perennial water and riparian vegetation because they are a surrogate to overall aquatic conditions, including water quality, the quality of fisheries, and the associated riparian habitat (USFS 2011b). Aquatic macroinvertebrates in the Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa are often used as indicator taxa because of their sensitivity to sedimentation and habitat degradation (Lenat and Barbour 1994; USFS 2011b). Specifically, EPT taxa require cool temperatures (Haidekker and Hering 2008), low sedimentation (Lemley 1982), and high levels of dissolved oxygen (Jacobson et al. 2003). Generally, decreased water quality (e.g., increased fine sediment, etc.) reduces intolerant species diversity and abundance (Reynoldson et al. 1997; Kaller and Hartman 2004). Thus threats to sensitive aquatic macroinvertebrates include climate change and land management practices that degrade water quality by increasing sedimentation and water temperature (USFS 2011b). Although baseline data collection is ongoing, the available data suggests that substrate composition, an indicator of habitat quality for macroinvertebrates, is stable on the Carson National Forest (USFS 2011b). Population trends of aquatic macroinvertebrates also appear to be stable on the forest (USFS 2011b).

Affected Environment

Miles of perennial streams were used for suitable habitat considerations as resident trout are indicators for this feature as well as the presence of riparian vegetation. It is possible some species may utilize intermittent drainages during the wetter months, but those additional miles were not considered for

analysis as the habitat availability within those areas is unknown. There are approximately 3.4 miles of perennial streams within the project area, which include Capulin Creek and the Rio Fernando River. Due to the lack of current information, fish presence is assumed for the potentially affected miles within the treatment areas although suitable habitat may not exist within some areas.

Potential treatments that could affect this species include riparian or vegetative treatments that occur alongside perennial water. The effects of these activities are described in detail in the *Environmental Consequences* section.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

About 100 percent of the available perennial stream miles could potentially be affected within the project boundary. These miles would likely be affected by adjacent vegetation treatments such as thinning and prescribed fire. There is likely a suitable prey base within the proposed action area for all both Rainbow and Brown Trout as overhanging vegetation and a rocky substrate is present along both streams.

Direct effects to these species include potential disturbance and relocation during project activities due to noise and vibrations from equipment. Fish that are startled would likely move to adjacent, undisturbed habitat until project activities cease, so the effects would be localized and temporary. There is also the potential for increased sedimentation in local areas when machinery is operated within the immediate vicinity of a stream. The reduction in visibility may affect the fishes' ability to forage during implementation, although fish can relocate to adjacent, undisturbed habitat during project activities. However, stream turbidity should return to normal a few hours after operation activities have ceased.

Spawning for the Rainbow Trout should not be affected as project design features specify that sediment-generating activities within riparian areas should be avoided during Rio Grande Cutthroat Trout spawning periods between March and July. Since this species spawns in spring, effects to spawning Rainbow Trout or eggs should be avoided. However, it is possible some spawning Brown Trout may be negatively affected by project activities as this species spawns in the fall. Machinery near and within the river channel may disturb some migrating or spawning individuals. However, due to the temporary nature of this project, fish behavior would likely return to normal after project activities have ceased. In addition, there is ample upstream and downstream habitat that would be unaffected by implementation activities, so displacement of some spawning individuals would not have an adverse effect on the population of Brown Trout.

Indirect effects may include a temporary reduction of prey base (macroinvertebrates) during some project activities because of increased sedimentation caused by machinery. These activities could include road maintenance, vegetative treatments adjacent to the stream, creation of 5 miles of new roads that includes 3 stream crossings, and prescribed fire. Increased sedimentation and turbidity could occur locally if machinery is used or prescribed fire occurs within the immediate vicinity of a stream. However, it is likely turbidity would subside a few hours after operation activities have ceased and the aquatic invertebrate prey base would likely return to pre-implementation levels in the summer following implementation. These effects are likely to be very minor as foraging fish can relocate to adjacent, undisturbed areas that support ample populations of prey. Both temporary and new system roads would be designed to reduce the potential for erosion and sedimentation.

Streamside restoration treatments along Capulin Creek and the Rio Fernando River are expected to benefit trout species over the long-term. Re-establishment of riparian vegetation would likely encourage additional herbaceous aquatic vegetation. This vegetation could potentially increase bank stability and may increase overhanging vegetation habitat. In addition, vegetation treatments would increase the resiliency of adjacent stands against uncharacteristic wildfire.

The recruitment of snags and large woody debris could potentially provide additional in-stream cover for this species. Snag and woody debris lodged within the river system also slows water and creates pools, would likely increase resting and spawning habitat for all fish species.

Spring development proposed under both action alternatives has the potential to impact water availability and macroinvertebrate habitat in and adjacent to these sites by partially reducing water availability and connectivity to streams. However, with application of Best Management Practices (BMPs), these improvements are expected to improve watershed condition (see Hydrology section).

In summary, project activities may cause some immediate displacement of Rainbow Trout, Brown Trout, and aquatic invertebrates consumed as prey. However, vegetation and erosion-reducing treatments would likely to be beneficial to this species over the long-term as habitat conditions may improve and perennial waters would be less likely to succumb to the effects of uncharacteristic wildfire.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on rainbow trout, brown Trout, and macroinvertebrates. These activities include grazing, recreation adjacent to perennial streams, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, the Trampas allotment and the Rio Chiquito allotment are two active grazing allotments within the Pueblo Ridge project boundary. Herbaceous areas (including grasslands) and riparian habitats has been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition in riparian areas. It is likely this historical grazing had a negative effect on these fish species. Overgrazing may have contributed to a decrease in wetland and stream function because of increased erosion from hoof shear and widening of areas utilized for drinking and frequent crossing. Currently, grazing is actively managed and some site-specific areas with sensitive soils could be negatively impacted. However, the improvements to riparian and streamside vegetation and repairs to existing erosion and sediment problems would likely offset any localized effects due to erosion caused by cattle. Thus grazing would not likely contribute to any significant additive effects across the landscape, but may contribute to some site-specific reduction in prey species due to localized sedimentation.

Recreational activities (such as off-road vehicle use, camping, hiking, horseback riding, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence from fishing with project activities, but this disturbance is likely short-term because project and recreation activities would not occur without interruption for extended periods of time.

It is likely that previous vegetation treatments occurring within the past 10-15 years provide a cumulative benefit to protecting perennial streams against the effects of uncharacteristic wildfire. Since other areas within the watershed have been thinned and burned, they are less likely to support stand-replacing wildfire, which could potentially increase sediment erosion into perennial streams. Treating riparian areas

in combination with the existing treatments would decrease the likelihood of uncharacteristic wildfire and could potentially preserve extant populations of these fish species.

Determination

Alternatives 1 and 2

Due to limited spatial and temporal effects to rainbow trout, brown trout, and macroinvertebrates, and a benefit to streamside habitat and watershed resiliency, alternatives 1 and 2 would not affect forest-wide habitat and population trends for resident trout.

Migratory Birds

Physiographic data regarding high-priority migratory bird species have been compiled by Partners in Flight (PIF) for New Mexico (PIF 2007). Additionally, the U.S. Fish and Wildlife Service (USFWS) have determined “Birds of Conservation Concern” and outlines species of concern based on the Southern Rockies and Colorado Plateau habitat feature (Bird Conservation Region #16; USFWS 2008). The USFWS IPAC list generated for threatened, endangered, and proposed species also provides a list of migratory birds of conservation concern that may occur within the project boundary. These lists and the habitat type at the project site contribute to the species analyzed for this project. Lists from all sources do not contain the same birds, so the list of species analyzed for this project considers both PIF and USFWS as well as local knowledge of species utilization of these habitats. Species that were already analyzed within this document, such as threatened and endangered species, and species that would likely not occur within the treatment areas, such as Ferruginous hawk (*Buteo regalis*), were removed. All species listed have not necessarily been identified within the treatment areas, but have the potential of occurring.

In addition, there are no documented Important Bird Areas within the project area. These are areas that are identified within the Landbird Strategic Plan as supporting bird key populations for reproduction, migration, or over-wintering or areas identified by the Audubon Society as having key habitat that supports life history characteristics for bird populations.

For purposes of this analysis, effects to species within the project area are disclosed.

Potential for Effects

The proposed treatment areas occur within piñon/juniper woodland, ponderosa pine forest, oak, aspen, mixed conifer forest, spruce/fir, and riparian woodland. Species associated with these habitats are listed in Tables 13-17. General effects instead of species-specific effects to migratory birds are disclosed in the *Environmental Consequences* section. Some species may be found within more than one habitat, but are only classified into one for purposes of simplifying this analysis.

Piñon/juniper woodland species

Piñon/juniper woodland habitat type is found throughout the state above desert or grassland vegetation and below pine forest, ranging from 4,500 to 7,500 feet in elevation. There are three high-priority migratory bird species that may utilize this habitat type (**Table**).

Table 26. High-priority migratory bird species within piñon/juniper woodland habitat.

Species of concern	Habitat Considerations
Gray flycatcher (<i>Empidonax wrightii</i>)	Prefers open, coniferous woodlands and usually nests in piñon or juniper trees. Forages by consuming insects in flight or from the ground, foliage, tree bark, and branches (Sclossberg and Sterling 2013).
Pinyon jay (<i>Gymnorhinus cyanocephalus</i>)	Strongly associated with piñon-juniper habitat for foraging and breeding; moves with pine nut production. This species will also utilize ponderosa pine habitat. Consumes a variety of food sources, including pine seeds, juniper berries, cultivated grains, arthropods, reptiles, nestling birds, and small mammals (Balda 2002).
Black-throated gray warbler (<i>Setophaga nigrescens</i>)	Prefers open coniferous or piñon/juniper associations with brushy undergrowth. Forages for insects in various tree structures (Guzy and Lowther 2012).

Ponderosa pine forest species

Ponderosa pine forest habitat type is found in mountainous areas throughout the state at elevations of 6,000 to 9,000 feet. The ponderosa pine forest habitat identifies three migratory bird species (**Table**).

Table 27. High-priority migratory bird species within ponderosa pine forest habitat.

Species of concern	Habitat Considerations
Flammulated owl (<i>Psiloscops flammeolus</i>)	Associated with open ponderosa pine, mixed conifer, or aspen, and has a preference for mature or old growth stands. Nests in secondary cavities and predominately preys on invertebrates (Linkhart and McCallum 2013).
Virginia's warbler (<i>Oreothlypis virginiae</i>)	Prefers pine and piñon-juniper woodlands with dense thickets of shrubby understory vegetation. Strong association for breeding in open forests with steep draws, drainages, or slopes within shrubby understory vegetation. Forages on insects from vegetation or in flight (Olson and Martin 1999).
Grace's warbler (<i>Setophaga graciae</i>)	Prefers open stands of mature and old growth pines for foraging and nesting. Forages high in mature pines by consuming insects from foliage (Stacier and Guzy 2002).

Mixed-conifer forest species

Mixed conifer forest habitat type is found in all higher mountain ranges in New Mexico, generally between 7,500 to 10,000 feet. There are four migratory bird species identified for this habitat (**Table**).

Table 28. High-priority migratory bird species within mixed-conifer forest habitat.

Species of concern	Habitat Considerations
Williamson's sapsucker (<i>Sphyrapicus thyroideus</i>)	Prefers conifer habitat, sometimes with a quacking aspen component. Favors nest sites adjacent to open ponderosa forest. Prefers to nest in newly-excavated cavities in both live and dead trees. Mostly forages on conifer sap but highly dependent on ants after young hatch. This species will also consume other insects during the breeding season and fruits during the winter (Gyug et al. 2012).
Olive-sided flycatcher (<i>Contopus cooperi</i>)	Associated with openings and edges in mixed conifer habitat and prefers forest with less than 40% canopy cover. Nests in trees near the tip of a horizontal branch. Feeds almost exclusively on flying insects. Forages from a high, prominent perch to consume insects flying in unobstructed air space in forest clearings (Altman and Sallabanks 2012).

Species of concern	Habitat Considerations
Cassin's finch (<i>Haemorhous cassinii</i>)	Prefers open, mature coniferous pine forests. Forages on the ground or in foliage for a variety of foods including insects, berries, and seeds. Usually nests in conifers on a lateral branch or near the top of a tree crown (Hahn 1996).
Band-tailed pigeon (<i>Patagioenas fasciata</i>)	Prefers mixed-conifer or spruce/fir habitats with abundant berry-producing shrubs used for foraging. Band-tailed pigeons will consume seeds, fruit, acorns, pine nuts, and flowers of trees and shrubs. Usually builds a loosely intertwined nest of twigs on a tree branch (Keppie and Braun 2000).

Spruce/fir forest species

Spruce/fir habitat generally occurs from 9,500 feet in elevation to treeline. There is one migratory bird species identified for this habitat type (Table).

Table 2. High-priority migratory bird species within spruce/fir forest habitat.

Species of concern	Habitat Considerations
Dusky grouse (formally blue grouse; (<i>Dendragapus obscurus</i>))	Dusky grouse will utilize in a variety of habitats from sagebrush to forested stands across its range. In New Mexico, they nest on the ground in montane forest with relatively open tree canopies (PIF 2007) or in meadow edges or openings with structural diversity (BISON-M 2017y). They forage in conifer trees, on the forest floor, and in openings and will consume needles, buds, and conifer cones as well as fruits, seeds, and insects (BISON-M 2017y).

Riparian woodland species

Both middle and high-elevation riparian woodland habitats were considered for this analysis. Middle riparian woodlands generally persist within 3,000 - 7,500 feet in elevation. High-elevation riparian woodlands occur from 7,500 feet to treeline and consists of trees and shrubs associated with permanent water. There are four species associated with this habitat (Table).

Table 30. High-priority migratory bird species within riparian woodland habitat.

Species of concern	Habitat Considerations
Lewis's woodpecker (<i>Melanerpes lewis</i>)	Lewis's woodpeckers prefer open habitat in ponderosa pine, riparian woodlands, or logged or burned pine. Nest sites are excavated in the trunk or on branches of large, dead, or decaying trees, so snags are an important component of this species' life history. This species will consume insects, acorns or other nuts, and fruit (Vierling et al. 2003).
red-naped sapsucker (<i>Sphyrapicus nuchalis</i>)	Preferred habitat for includes deciduous and mixed woodlands including aspen groves, ponderosa pine forests, montane coniferous forests, and occasionally subalpine forest edges. In late spring or early summer (May-June), sapsuckers utilize cavities in both live and dead trees for nesting. Sapsuckers will drill sap wells and consume sap from a variety of tree species. They will utilize previously-drilled wells as well as drill new ones. Red-naped sapsuckers also consume fruit and arthropods in addition to tree sap (Walters et al. 2014).
veery (<i>Catharus fuscescens</i>)	Preferred habitat consists of damp, deciduous forests with a dense understory and is usually associated with beaver wetlands. Veerys begin nesting in late spring and will nest on or near the ground at the base of or in a bush or small tree. Veerys forage mostly on the ground for fruit and insects although they will also forage in foliage (Bevier et al. 2005).

Species of concern	Habitat Considerations
Cordilleran flycatcher (<i>Empidonax occidentalis</i>)	Cordilleran flycatchers use a variety of habitats from riparian areas, ponderosa/oak forests, mixed-conifer, and spruce/fir and are generally associated with water courses and timber openings. They will nest in rocky outcroppings, natural cavities, root-masses, rotten logs, and in niches along stream banks. This species feeds almost exclusively on insects caught in the air or gleaned from tree and shrub foliage (Lowther et al. 2016).

Affected Environment

Due to the varied habitat utilized by migratory species identified within this analysis, all 9,709 acres across all habitat types is considered suitable habitat. However, not all species identified within this analysis will utilize all of the habitat types. Migratory bird habitats available within the project area that may be affected by project activities represent a minor portion of habitats available forest-wide (table 31).

Table 31. Project area and Forest-wide vegetation type amounts

Vegetation Type	Project Area (ac)	Forest-wide (ac)	Percentage of Forest-wide Habitat (ac)
Mixed-Conifer	3,855	349,716	40%
Ponderosa Pine	2,776	372,177	28%
Piñon/Juniper	2,368	269,091	24%
Aspen	476	36,973	5%
Spruce/fir	51	168,042	<1
Riparian	81	23,599	1%

Potential treatments that could affect migratory birds include: manual and mechanical vegetation treatments in all habitat types, prescribed fire, road maintenance and construction and temporary access for project activities, and spring development.

Environmental Consequences

Alternatives 1 and 2

Direct and Indirect Effects

Noise from vehicular traffic and machinery from project activities (e.g. cutting and removing trees, improving system roads, or cutting and scattering slash) may temporarily displace migratory bird species and invertebrate prey items during implementation activities. Any present foraging individuals or prey would likely move out of the disturbed area into adjacent, undisturbed habitat. This disturbance would likely be short-term and localized in nature, consisting of phased tree removal and traffic. It is expected prey individuals would also return once implementation activities have ceased and herbaceous ground cover recovers from potential compaction due to machinery.

Cutting and removal of vegetation within the treatment areas may result in a few displaced individuals or pairs of migratory birds and may result in the loss of eggs or nestlings if a nest tree is removed. Removal of trees may also decrease winter forage availability for some species that rely on seeds. However,

selective removal of some trees may benefit migratory birds by creating forest stands with a more open canopy and increasing interspaces between tree groups. This would likely create a greater diversity of structural stages, increase biodiversity, and improve or create specific habitat niches over the long-term. Opening the understory would also simulate arthropod availability as habitat would increase for invertebrate prey species. Migratory birds that rely on mature stands for nesting would also benefit from increased tree vigor due to the removal of smaller, competing trees.

Prescribed fire within the treatment areas would have similar effects on migratory birds. Individuals or pairs would likely be displaced due to project activities and there is the potential for some nestling loss due to smoke or tree mortality if fires occurred during the breeding season. It is expected individuals or pairs would return after prescribed fire activities have ceased. Arthropod density may decrease initially after project activities but should return to pre-implementation levels after the ground cover naturally revegetates. Some areas containing shrubby understory may no longer contain suitable habitat for some species if those areas are burned with a greater fire intensity. However, fire would likely burn in a mosaic and would leave other patches unaffected, so potentially affected migratory bird species can relocate to adjacent habitat. The use of prescribed fire may potentially increase breeding cavity availability for some species of migratory birds due to some tree mortality and snag recruitment. Over the long-term, the use of prescribed fire would likely improve habitat structure and may protect forested stands from stand-replacing wildfire as fuel loading would be reduced.

Overall, the combination of vegetation treatments and prescribed fire may negatively impact some migratory birds in the short-term, but would likely improve quality habitat and structure within forested stands across all habitat types. Vegetative prescriptions would manage for uneven-age forest stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels. Silviculture prescriptions would also manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Prescribed fire would likely burn with a variety of intensities across the landscape and may create some open pockets, depending on the amount of fuel available, which would increase both foraging and breeding habitat for some species of migratory birds. In the long-term, the combination of vegetative treatments and prescribed fire would result in a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape, and increased understory vegetation, which are all beneficial for the health and resiliency of the forest. Thus it is likely forested habitat for migratory birds would improve and important habitat features (such as snags and downed logs) would be maintained or created with the activities under the action alternatives.

Despite the aforementioned short-term disturbances, migratory birds would likely benefit from treatments in riparian areas, along streams, and improvements to areas with erosion. Re-establishment of riparian vegetation would likely encourage additional herbaceous streamside vegetation which could be utilized both habitat for migratory birds and invertebrate prey.

Overall, forested habitat would likely improve in both alternatives. Project activities may cause some short-term displacement or loss of migratory bird species, but birds can relocate to adjacent, undisturbed habitat and populations would persist regardless of these project activities. Improving the habitat by improving ecosystem function would also move the forest into a healthier and more resilient condition that may withstand wildfire, pathogens, or a beetle outbreak, which would help sustain populations of migratory birds.

Cumulative Effects

Past, present, and reasonably foreseeable activities that overlap in time and space with the treatment areas could have a cumulative effect on migratory birds and their habitats. These activities include grazing, recreation, and historic timber management and prescribed fire projects.

The project boundary has historically been grazed for several hundred years. Currently, there are four active grazing allotments within the Pueblo Ridge Cumulative Effects Analysis Area. Herbaceous areas (including grasslands) and riparian habitats have been affected by historical and on-going grazing activities on federal lands and private lands. Heavy grazing in the past before grazing management by the Forest Service likely altered plant species composition and reduced the amount of herbaceous and woody vegetation. Historical grazing would have had a negative effect on migratory birds due to the loss of forage, changes to timber stand structure used for cover, and removal of vegetation that would maintain an adequate forage base. Currently, grazing is actively managed and some site-specific areas with herbaceous cover could still be negatively impacted. Additional sunlight from tree removal and prescribed fire would encourage the growth of ground cover which is often used as forage or foraging habitat for many species of migratory birds and cattle. In addition, ground cover may be disturbed within the treatment areas during implementation activities due to machinery which may cause an additional reduction in forage or cover availability in addition to areas that are impacted by grazing. It is likely some cumulative disturbances due to grazing and project activities may displace some migratory birds, but overall available habitat would not be negatively affected. It is not likely cumulative effects from grazing would cause enough individual loss to effect populations of migratory birds.

Recreational activities (such as off-road vehicle use, camping, hiking, horseback riding, among others) have occurred in the past and would continually occur within treatment areas during project implementation. It is likely there may be an additive effect of noise and human presence, but this disturbance is likely short-term because project and recreation activities would not occur without interruption for extended periods of time. It is likely any present migratory birds may relocate to adjacent, undisturbed habitat and would return when recreation and project activities cease.

Timber stands adjacent to treatment areas have been altered by previous and current timber, fuelwood, and prescribed fire projects, listed in Table 8. District-wide dead and down permits and latilla permits may also change stand composition and the amount of downed logs that contributes to habitat for some migratory bird species. These combined activities likely opened the canopy and increased grass and shrub availability that could be utilized as both forage and cover. The improved stand condition and forest health across the landscape likely has a cumulative benefit to migratory birds. These treatments likely created some site-specific niche habitat for some species. In addition, these treatments contribute to an overall improved resiliency to wildfires and pest and pathogens across the landscape that could potentially destroy forested habitat.

Determination

Alternatives 1 and 2

Project activities would not have a measurable negative effect on migratory bird populations. Although some temporary disturbance is anticipated, improving the overall health and resiliency of the forest would likely benefit migratory birds over the long-term within the project area.

Environmental Consequences Summary

Resource Indicators

Four resource indicators were selected for this project to analyze and disclose potential project effects on wildlife and suitable habitat (**Table 1**). Although not all of these indicators were used for every species analyzed within this document, a general summary of the effects for each alternative is provided in **Table** .

Table 31. Effects summary for resource indicators utilized within this analysis and compared between alternatives.

Resource Indicator	Measure	Effects under Alternative 1	Effects under Alternative 2
Cover/habitat type or keystone habitat feature (suitable habitat)	Acres or miles	<p>Up to 9,709 acres treated and 3.4 miles of stream potentially affected (refer to Error! Reference source not found. for a specific acres within cover types; refer to analysis for species-specific affected acres or miles)</p> <p>Forested habitat would benefit from increased tree growth and vigor.</p> <p>Forest health and resiliency to uncharacteristic events would likely improve</p> <p>Ecosystem function would likely improve</p> <p>Overall quality of suitable habitat would likely improve over time for most terrestrial and aquatic species with application on of Project Design Criteria and BMPs described in the EA</p>	<p>Up to 9,709 acres treated and 3.4 miles of stream potentially affected (refer to Error! Reference source not found. for a specific acres within cover types; refer to analysis for species-specific affected acres or miles)</p> <p>Forested habitat would benefit from increased tree growth and vigor</p> <p>Forest health and resiliency to uncharacteristic events would likely improve</p> <p>Ecosystem function would likely improve</p> <p>Overall quality of suitable habitat would likely improve over time for most terrestrial and aquatic species with application on of Project Design Criteria and BMPs described in the EA</p>

Resource Indicator	Measure	Effects under Alternative 1	Effects under Alternative 2																																																																																																																								
Forest structure – diameter distribution	VSS	<p>Using FVS adjustments in alternative 1, Stands would move towards a more desired VSS class (Table 15. Goshawk habitat structure amounts, existing condition and post-treatment, Alternative 2</p> <table> <tr> <th>VSS Class</th><th>Existing Condition</th><th>Alternative 2 Post-treatment</th><th>Change</th></tr> <tr><td>1</td><td>138</td><td>112</td><td>+57</td></tr> <tr><td>2</td><td>40</td><td>0</td><td>-33</td></tr> <tr><td>3A</td><td>133</td><td>205</td><td>+2</td></tr> <tr><td>3B</td><td>942</td><td>451</td><td>-593</td></tr> <tr><td>3C</td><td>661</td><td>0</td><td>-460</td></tr> <tr><td>4A</td><td>0</td><td>1,019</td><td>+1,009</td></tr> <tr><td>4B</td><td>1,547</td><td>1,936</td><td>+489</td></tr> <tr><td>4C</td><td>1,241</td><td>335</td><td>-1,040</td></tr> <tr><td>5A</td><td>104</td><td>822</td><td>+775</td></tr> <tr><td>5B</td><td>658</td><td>799</td><td>+114</td></tr> <tr><td>5C</td><td>454</td><td>322</td><td>-146</td></tr> <tr><td>6A</td><td>116</td><td>625</td><td>+506</td></tr> <tr><td>6B</td><td>516</td><td>248</td><td>-265</td></tr> <tr><td>6C</td><td>96</td><td>64</td><td>-32</td></tr> </table> <p>).</p> <p>Large tree distribution would be promoted and would likely improve habitat quality for most species</p> <p>VSS1 881 ac VSS2 48 ac VSS3 338 ac VSS4 3,573 ac VSS5 3,559 ac VSS6 1,157 ac</p>	VSS Class	Existing Condition	Alternative 2 Post-treatment	Change	1	138	112	+57	2	40	0	-33	3A	133	205	+2	3B	942	451	-593	3C	661	0	-460	4A	0	1,019	+1,009	4B	1,547	1,936	+489	4C	1,241	335	-1,040	5A	104	822	+775	5B	658	799	+114	5C	454	322	-146	6A	116	625	+506	6B	516	248	-265	6C	96	64	-32	<p>Using FVS adjustments in alternative 2, Stands would move towards a more desired VSS class (Table 15. Goshawk habitat structure amounts, existing condition and post-treatment, Alternative 2</p> <table> <tr> <th>VSS Class</th><th>Existing Condition</th><th>Alternative 2 Post-treatment</th><th>Change</th></tr> <tr><td>1</td><td>138</td><td>112</td><td>+57</td></tr> <tr><td>2</td><td>40</td><td>0</td><td>-33</td></tr> <tr><td>3A</td><td>133</td><td>205</td><td>+2</td></tr> <tr><td>3B</td><td>942</td><td>451</td><td>-593</td></tr> <tr><td>3C</td><td>661</td><td>0</td><td>-460</td></tr> <tr><td>4A</td><td>0</td><td>1,019</td><td>+1,009</td></tr> <tr><td>4B</td><td>1,547</td><td>1,936</td><td>+489</td></tr> <tr><td>4C</td><td>1,241</td><td>335</td><td>-1,040</td></tr> <tr><td>5A</td><td>104</td><td>822</td><td>+775</td></tr> <tr><td>5B</td><td>658</td><td>799</td><td>+114</td></tr> <tr><td>5C</td><td>454</td><td>322</td><td>-146</td></tr> <tr><td>6A</td><td>116</td><td>625</td><td>+506</td></tr> <tr><td>6B</td><td>516</td><td>248</td><td>-265</td></tr> <tr><td>6C</td><td>96</td><td>64</td><td>-32</td></tr> </table> <p>).</p> <p>Stands would move towards a more desired VSS class in alternative 2.</p> <p>Large tree distribution would be promoted and would likely improve habitat quality for most species</p> <p>VSS1 590 ac VSS2 55 ac VSS3 922 ac VSS4 3,705 ac VSS5 3,592 ac VSS6 952 ac</p>	VSS Class	Existing Condition	Alternative 2 Post-treatment	Change	1	138	112	+57	2	40	0	-33	3A	133	205	+2	3B	942	451	-593	3C	661	0	-460	4A	0	1,019	+1,009	4B	1,547	1,936	+489	4C	1,241	335	-1,040	5A	104	822	+775	5B	658	799	+114	5C	454	322	-146	6A	116	625	+506	6B	516	248	-265	6C	96	64	-32
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Forest structure – stand density	Basal area per acre (ft ² /acre) or trees/acre	<p>Basal area and trees/acre would be reduced in treatment areas and would move closer to sustainable condition ranges</p> <p>Reduced basal area and trees/acre would improve habitat quality for a number of species by increasing remaining tree vigor and health</p> <p>Reduced fuel availability to promote uncharacteristic, stand-replacing events</p>	<p>Basal area and trees/acre would be reduced in treatment areas and would move closer to sustainable condition ranges</p> <p>Reduced basal area and trees/acre would improve habitat quality for a number of species by increasing remaining tree vigor and health</p> <p>Reduced fuel availability to promote uncharacteristic, stand-replacing events</p>																																																																																																																								

Resource Indicator	Measure	Effects under Alternative 1	Effects under Alternative 2
Old growth allocation	Acres present after allocation	<p>20% of acres within the piñon/juniper, ponderosa pine, mixed-conifer, and spruce and spruce/fir habitats (total 2,284 acres) will be allocated for old growth</p> <p>Large trees will be maintained (larger VSS 4 and above); habitat quality may improve for a variety of species by promoting the persistence and health of an older and mature age class of trees</p>	<p>20% of acres within the piñon/juniper, ponderosa pine, mixed-conifer, and spruce and spruce/fir habitats (total 2,284 acres) will be allocated for old growth</p> <p>Large trees will be maintained (larger VSS 4 and above); habitat quality may improve for a variety of species by promoting the persistence and health of an older and mature age class of trees</p>

Determination Summary

A list of all effects determinations for all species compared between alternatives is displayed in **Table .**

Table 32. A summary of all effects determinations compared between alternative 1 and alternative 2 for all species within the wildlife report for the Pueblo Ridge project.

Species	Effect determination under alternatives 1 and 2
<i>Threatened and Endangered Species</i>	
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	May affect, but not likely to adversely affect
Canada lynx (<i>Lynx canadensis</i>)	May affect, but not likely to adversely affect
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	No effect
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	No effect
<i>Forest Service Sensitive Species</i>	
Northern leopard frog (<i>Lithobates pipiens</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Bald eagle (<i>Haliaeetus leucocephalus</i>)	No effect.
Northern goshawk (<i>Accipiter gentiles</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
American peregrine falcon (<i>Falco peregrinus anatum</i>)	No effect
White-tailed ptarmigan (<i>Lagopus leucurus</i>)	No effect
Burrowing owl – western (<i>Athene cumicularia hypugaea</i>)	No effect
Boreal owl (<i>Aegolius funereus</i>)	No effect
cinereus (masked) shrew (<i>Sorex cinereus cinereus</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
water shrew (<i>Sorex palustris navigator</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
spotted bat (<i>Euderma maculatum</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability

Species	Effect determination under alternatives 1 and 2
pale Townsend's big-eared bat (<i>Corynorhinus townsendii pallescens</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
American pika (<i>Ochotona princeps saxatilis</i>)	No effect
Gunnison's prairie dog (<i>Cynomys gunnisoni</i>)	No effect
American marten (<i>Martes americana origenes</i>)	No effect
Rio Grande Sucker (<i>Castostomus plebeius</i>)	No effect
Rio Grande Chub (<i>Gila pandora</i>)	No effect
Rio Grande Cutthroat Trout (<i>Oncorhynchus clarki virginalis</i>)	No effect
nokomis fritillary (<i>Speyeria nokomis nokimis</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
yellow lady's slipper (<i>Cypripedium parviflorum var. pubescens</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
alpine larkspur (<i>Delphinium alpestre</i>)	No effect.
robust larkspur (<i>Delphinium robustum</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Pecos (hairless) fleabane (<i>Erigeron subglaber</i>)	No effect
Arizona willow (<i>Salix arizonica</i>)	May effect individuals but is not likely to result in a trend toward listing or a loss of viability
Management Indicator species	
Brewer's sparrow (<i>Spizella breweri</i>)	Would not affect forest-wide habitat and population trends
Plain (juniper) titmouse (<i>Baeolophus ridgwai</i>)	Would not affect forest-wide habitat and population trends
White-tailed ptarmigan (<i>Lagopus leucurus</i>)	Would not affect forest-wide habitat and population trends
Hairy woodpecker (<i>Picoides villosus</i>)	Would not affect forest-wide habitat and population trends
Wild turkey (<i>Meleagris gallopavo</i>)	Would not affect forest-wide habitat and population trends
Rocky mountain bighorn sheep (<i>Ovis canadensis canadensis</i>)	Would not affect forest-wide habitat and population trends
Abert's squirrel (<i>Sciurus aberti</i>)	Would not affect forest-wide habitat and population trends
Red squirrel (<i>Tamiasciurus hudsonicus</i>)	Would not affect forest-wide habitat and population trends
Rocky Mountain elk (<i>Cervus elaphus nelsoni</i>)	Would not affect forest-wide habitat and population trends
Resident trout	Would not affect forest-wide habitat and population trends
Aquatic macroinvertebrates	Would not affect forest-wide habitat and population trends

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